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PROCEEDINGS
OF THE MARINE SAFETY COUNCIL

Vol. 37, No. 1

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U.S. Department of Transportation
U.S. Coast Guard

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PROCEEDINGS
OF THE MARINE SAFETY COUNCIL

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maritime idelights

NANCY DIVING DANGERS

NOAA survey of female divers has confirmed that children can be harmed if nothers do not limit the nd duration of scuba dives regnancy.

damage to unborn children to stem from the likelihat a fetus has a much usceptibility to decompressess than does the mother.

ard A. Frank, Administrathe National Oceanic and heric Administration , said the survey supports ions made last year in NOAA study concerning ards of women scuba diving egnant.

recent survey showed that f 24 women who had dived ths greater than 100 feet regnant gave birth to malinfants. Two other women ed extensively during pregbut not to the 100-foot also bore children with deformities.

year, pressure chamber ere conducted in which t sheep were monitored for bubbles in fetal blood Under compression equal to ot depths for 25 minutes, in the fetal circulation so massive the fetuses would have died had they n treated promptly.

findings from these tests AA to issue a warning that tandard, no-decompression o 100 feet were risky for t women.

ensible approach for pregba divers is to limit dives eet (18.3 meters); limit the of dives to one-half the ngth recommended by U.S. ecompression tables; and strenuous dives, underg (hypoventilation) and g chilled.

327 AMERICAN FLAG VESSELS "ADOPTED" BY ELEMENTARY SCHOOL CLASSROOMS

"Our Adopt-A-Ship Fleet numbers over 325 United States Flag Merchant Ships! We expect this number will increase before the year is over," announced Captain William V. Figari, National President of the Propeller Club of the United States. At present, 25 steamship companies have 327 ships participating in the program.

In the Adopt-A-Ship plan, sponsored by The Propeller Club for over 40 years, American grade school students "adopt" American flagships which have been made available throught the public spirited cooperation of participating U.S. steamship companies and their ships' captains. Classes and Masters correspond during the year that each ship is "adopted." School children have an opportunity to ask many questions about the ship and crew, cargoes carried and countries visited. Ships' captains and other officers send information concerning ships, trade routes, climate, weather, geography and history, and origins of cargoes carried and their importance to industries located far from the seacoasts that use such materials in manufacture of products. Captains often visit assigned classrooms. Classes frequently have the opportunity to visit their "adopted" ships when they are in port. Grade school classes in the plan represent most of the 50 states.

American flag steamship companies and ships participating in this educational program are to be commended for their interest in the education of young students.

DANGER OF FIRE/EXPLOSION DURING CARGO TRANSFER OPERATIONS DUE TO ELECTRICAL STORMS

Two major marine casualties have recently occurred as the result of tank vessels being struck by lightning while moored at transfer facilities. Those involved in cargo operations are reminded of the cautionary requirements contained in 46 CFR 35.35-40 in regard to the non-commencement or termination of cargo operations during severe electrical storms. It is apparent that determinations as to severity of electrical storms are subjective, inasmuch as serious casualties have occurred during storms of relatively short duration and moderate magnitude. Some emphasis should be placed on the option of not commencing transfer operations where electrical storms are predicted for the transfer area.

Reprinted from the Portland, Oregon Marine Safety Office Marine Safety Newsletter.

NEW VISITORS CENTER AT SEAMEN'S CHURCH INSTITUTE

"Sailing Vessels to Supership" is the special opening exhibit of the new visitors center at the Seamen's Church Institute of New York and New Jersey, located at 14 State Street, New York City (just across from Battery Park).

The new center was officially opened December 10, 1979. Its hours are 11:00 a.m. to 3:00 p.m. Monday through Saturday; admission is free.

The current show features ship models, marine art and seamen's crafts, plus photographs, artifacts and documents from the Institute's collection that highlight both the history of the Institute and the world of merchant shipping. Of special interest are a new cutaway model of the Barber Steamship Line's new vessel the Dana Caribia, shown loaded with cargo; and a giant, scaled supergraphic illustrating the relative size of prototype merchant vessels from the 16th century to the present.

For more information on this exhibit and/or the Institute, call Carlyle Windley at (212)269-2710.

PETROLEUM CARGO TRANSFER IN ANY ~~CALM~~ WEATHER

Hydrocarbon vapors are generally heavier than air. During cargo loading, ballasting or even inerting and tank cleaning operations, particularly with gasoline, a hazard

Continued on next page.....

MARITIME SIDELIGHTS.....

exists that some persons may not take into consideration. This information usually gets only one or two paragraph coverage in the various manuals on tank vessel operations, but has the potential for resulting in disastrous fire or explosion. Vapors expelled from a tank are dispersed by wind, if there is any. Where the wind velocity is low, this dispersal may not be effective and the vapors may remain on or near the deck, and may flow into any deckhouse openings. Also, they may flow over the sides of the vessel and form a layer on the water entending hundreds of feet. A source of ignition within the deckhouse, out on deck or even many yards from the ship (such as from a passing vessel) may ignite the fumes. The result can be catastrophic. This situation is not merely hypothetical, but has actually occurred. For example, from the NTSB report on the SS SANSINENA explosion in 1976, "When great quantities of cargo tank gases are expelled while loading or ballasting cargo tanks, a region of flammable gases can develop around the gas outlet vent and, under low wind speed conditions, the flammable gases can extend to the ship's main deck and topside structures where most sources of ignition are located." The Chief Mate on the SS SANSINENA estimated the winds to be 2 to 3 knots. When the M/V VENUS exploded in 1972 the wind was about 4 mph right on the bow (she was anchored). Some of her companionway doors were open during gas freeing.

In looking over various other cases to use as examples for this article it was noticed that low wind velocity very often plays a part in casualties involving fire or explosion on tank vessels. It was also noticed that the wind itself could actually be fairly high but the relative wind at the venting areas was low. For example, the measured wind near the SS SANSINENA was 8 knots but was coming from the stern and was blocked by the after structure. Another ship was underway in 10 to 15 knots of wind but, you guessed it, she was making 12 knots down wind. That is why the title of this article was changed.

Various studies have shown that the most concentrated gas emissions occur toward the end of loading or ballasting, and under certain critical conditions, flammable mixtures can exist at a considerable distance (about 100 feet) from a vent outlet. The factors most critical to the occurrence and dispersion of concentrated gas mixtures are the loading rate, gas efflux velocity, crude vapor content of efflux gas, and wind speed and direction relative to the ship. Wind speed has been found to have a significant role in the dispersion of cargo tank vapor emissions. When the wind speed is about 10 mph, vapor dispersion is rapid and flammable mixtures are limited to the immediate vicinity of the vent outlet. However, as the wind speed drops to below 10 mph, flammable mixtures can extend greater distanceves from the vent outlet.

Persons in charge of cargo operations should evaluate weather conditions before commencing any operation that will cause vapors to be released. Additionally, regardless of the weather, deckhouse areas are required to have all openings (doors or ports) closed during transfer, so that vapors cannot get into areas containing sources of ignition. All openings into tanks should have flame screens, so that if topside fumes are ignited the flames cannot travel back into the tank and cause an explosion.

Reprinted from the Portland, Oregon Marine Safety Office's November 1979 Marine Safety Newsletter.

Quite a few rules have been published since our last issue. One package of note would be the four rules published December 17, 1979 establishing the new visual distress signal standards (CGD 76-048A, 76-048B, 76-183 and 76-183A), which were published along with a rule eliminating Coast Guard factory inspection of lifesaving equipment (CGD 76-048). Aside from these, three other rules of interest published in December are CGD 75-075, the final rules for the carriage of benzene, CGD 79-161 relating to the shipment and discharge of seamen and CGD 79-063, which shortens the time limitation for the re-examination for licenses.

Proposed rules of interest have also been published. On November 29 the proposed rules on safety approval of cargo containers (CGD 79-027) appeared. On December 3 proposed rules entitled "Conditions for Vessel Operation and Cargo Transfer" CGD 79-026 were published, as were CGD 79-072, proposed rules for stowage of lifeboats and liferafts. On December 10 the proposed rules for hopper dredges (CGD 76-080) were published and on December 13 proposed ocean dumping regulations were published.

There are still quite a few projects calling for NPRM's or final rules in the near future. The anticipated dates for publication are listed in the synopsis provided below. These dates are, however, estimates and it is entirely possible that circumstances may be such that the dates may not be met. If the Council receives a request for a regulation which has not been published we will file your request and send a copy when published. We will also notify the individual by letter, explaining the situation, when the request is received.

The Council would be happy to answer questions on the progress of any of these rules; please don't hesitate to call or write us (address listed at the end of this column).

Parts 1-199 ($8.50) of the 1979 volume of 33 CFR and parts 1-29 ($4.25), 30-40 ($4.50) and 110-139 ($4.25) of Title 46 CFR are available from the Superintendent of Documents at this time. Copies may be obtained by writing:

SupDocs
U.S. Government Printing Office
Washington, DC 20402

Continued on next page.....

KEYNOTES.....

Titles 46 and 49 have not been received by our office but should be available shortly.

The *Proceedings* would like to receive comments/suggestions on any particular rules or areas of interest that should be included in this column.

Any questions regarding regulatory dockets or companies and individuals wishing to speak at public hearings should notify Captain P. J. Danahy **at our new address:** (G-CMC/TP24), U.S. Coast Guard Headquarters, 2100 Second St. SW, Washington, DC 20593; (202)426-1477.

* * *

QUALIFICATIONS OF THE PERSON IN CHARGE OF OIL TRANSFER OPERATIONS, TANKERMAN REQUIREMENTS
CGD 74-44, 74-44a

These regulations will redefine and establish qualifying criteria for the certifying of individuals engaged in the carriage and transfer of dangerous cargoes in bulk.

It has been found that most pollution incidents are the result of personnel error; consequently, the minimum qualifications of persons involved in handling polluting substances should be specified.

As stated in the last issue, these projects have been withdrawn (44 FR 25243). New NPRM's which were anticipated in June have been delayed and are now scheduled for publication early this year under new Coast Guard docket numbers 79-116 and 79-116a.

REVISION OF ELECTRICAL REGULATIONS
CGD 74-125

This regulation will constitute a general revision and updating of the electrical regulations to conform with latest technology. It will include steering requirements for vessels other than tank vessels.

This revision is occurring because industrial standards for electrical engineering have changed in the past few years, and the regulations must be brought up to date to reflect current industry practices.

An initial NPRM was published on June 27, 1977 (42 FR 32700). A supplemental NPRM will be issued early in 1980.

NEW TANK BARGE CONSTRUCTION
CGD 75-083
UPGRADE OF EXISTING TANK BARGE CONSTRUCTION
CGD 75-083a

This action is comprised of two regulatory projects centered on tank barge construction standards. These projects were the result of a Presidential initiative of March 17, 1977, directing a study of the tank barge pollution problem. One project will address new barge construction while the other will pertain to existing barges. Regulatory documents for both will be published at the same time and joint public hearings have been held.

In July 1977, the Coast Guard began a reexamination of the tank barge construction standards. It was determined that new construction would be treated separately from existing barges. An advanced notice of proposed rulemaking (ANPRM) was then issued to gather additional data and assess impacts related to existing barges.

The new NPRM on tank barge construction, withdrawing the prior NPRM and the ANPRM for existing tank barges, was published as part VI of the June 14, 1979 Federal Register (44 FR 34440 and 44 FR 34443, respectively).

Public hearings were held on the dockets as follows: August 2, 1979, Washington, DC; August 15, 1979, Seattle, WA; August 23, 1979, New Orleans, LA; September 5, 1979, Washington, DC; and September 7, 1979, St. Louis, MO. The comments given at the hearings have been incorporated in the docket.

On Thursday, November 8, 1979 a Federal Register notice extended the comment period on the project. This extension was based on the continued public interest and ran to December 1, 1979.

This extension has expired and no further comments will be accepted. A final rule on Tank Barge Construction (CGD 75-083) is presently anticipated in June of 1980 and an NPRM on Existing Tank Barges (CGD 75-083A) is scheduled for April of the same year.

Anyone wishing to make comments or obtain copies of the rulemaking may do so by contacting Capt. P. J. Danahy, Marine Safety Council **at our new address** (telephone number has not changed) which is given in the introduction to the Keynotes section.

POLLUTION PREVENTION, VESSELS AND OIL TRANSFER REGULATIONS
CGD 75-124a

This regulation would reduce accidental or intentional discharge of oil or oily wastes during vessel operations.

The basis of this regulation is threefold. First, there is the need to reduce the number and incidence of oil spills. Second, this regulation will help to clarify the existing rules. Finally, this regulation covers the additional requirement for oil-water separators under the 1973 International Convention for the Prevention of Pollution from Ships.

The NPRM was published on June 27, 1977 (42 FR 32670). A supplemental NPRM was published October 27, 1977 (42 FR 56625). The draft of the final rule is under review by the Marine Safety Council and should appear in January 1980.

DESIGN AND APPROVAL REQUIREMENTS FOR OIL POLLUTION PREVENTION EQUIPMENT
CGD 76-088a

These regulations set out specifications and procedures for approving oil-water separators, cargo monitors, bilge monitors and bilge alarms for use on merchant vessels. They are based upon international design and test specifications adopted by the International Maritime Consultative Organization (IMCO) as Resolution

Continued on next page.....

A-393X, and provide standards for equipment that is representative of the best technology presently available.

The final rule, published in the September 13, 1979 Federal Register (44 FR 53352), requires that performance testing of prospective equipment must be done by one of the independent testing laboratories designated by the Commandant (G-MMT). The following laboratories have received authorization to commence testing:

Underwriters Laboratories
Tampa, Florida, USA

National Sanitation Foundation
Ann Arbor, Michigan, USA

University of New Castle
New Castle Upon Tyne, UK

The following three regulations, CGD 77-057, CGD 77-058(b)(c)(d), and CGD 77-063, make up the Tanker Safety and Pollution Prevention (TSPP) Regulations. Public hearings have been held on the package, comments were requested and 541 have been received. A notice of delay in publishing the final regulations was published in the June 7, 1979 Federal Register (43 FR 32713). Final rules have been published and appeared in the November 19, 1979 Federal Register (44 FR 66500).

INERT GAS SYSTEM
CGD 77-057

This regulation would require certain oil tankers of 20,000 deadweight tons and over to be fitted with inert gas systems.

As part of the President's initiatives to reduce marine pollution, this regulation will reduce the possibility of in-tank explosions which have been the cause of some pollution incidents.

The Inflationary Impact Statement for this regulation was completed in May 1977. An NPRM was published February 12, 1979 (44 FR 8984). Hearings were held March 21, 1979 in Washington, DC and March 28, 1979 in San Francisco, CA; 136 comments were received and have been evaluated and the final rule has been published.

SEGREGATED BALLAST AND TANK CLEANING REGULATIONS
GCD 77-058(b), (c) and (d)

This four-part regulation was initiated when President Carter directed the Secretary of Transportation to issue new rules for oil tanker standards, which were to include segregated ballast on all tankers and double bottoms on all new tankers which call at American ports. The provisions of these proposed regulations have been changed by the February 1978 Intergovernmental Maritime Consultative Organization (IMCO) Conference to include Crude Oil Washing (COW) and Clean Ballast Tanks (CBT).

The NPRM was published May 16, 1977 (42 FR 24868). As a result of the IMCO Tanker and Pollution Prevention Conference of February 1978, a new NPRM was issued on February 12, 1979 (44 FR 8984). Public hearings were then held in March in Washington, DC and San Francisco, CA; 265 comments were received on the docket, and were analyzed and the final rules were formulated. These rules appeared in the Federal Register of November 19, 1979.

STEERING GEAR DESIGN STANDARDS TO PROVIDE REDUNDANCY
CGD 77-063

As part of the President's initiatives to reduce pollution, this regulation is needed to help reduce the possibility of a marine collision due to a loss of steering.

An NPRM was published May 16, 1977 (42 FR 24869). As a result of the IMCO *Tanker Safety and Pollution* Prevention Conference of February 1978, a new NPRM was issued on February 12, 1979 (44 FR 8984). Public hearings were held on the docket and 138 comments have been received and analyzed and the final rules have been published.

CONSTRUCTION AND EQUIPMENT EXISTING SELF-PROPELLED VESSELS CARRYING BULK LIQUEFIED GASES
CGD 77-069

These regulations would amend the current ones to include the substantive requirements of the "Code for Existing Ships Carrying Liquefied Gases in Bulk," adopted by the Intergovernmental Maritime Consultative Organization (IMCO). The use of liquefied gas has increased, as have the problems associated with it. Due to its unique properties and the dangers associated with them, new regulations are being drafted. The environmental impact statement and regulatory analysis were completed in February 1979 and an NPRM on these regulations is anticipated in early 1980.

LICENSING OF PILOTS
CGD 77-084

This regulation takes into account the problems caused by increased ship size and unusual maneuvering characteristics. The proposal would require recency of service for each route upon which a pilot is authorized to serve, licensing with tonnage limitations commensurate with pilot experience, and consideration of ship-handling simulator training for pilots of very large vessels. A regulatory analysis and work plan were completed in October 1978. An NPRM is expected in January 1980.

REVISION OF 46 CFR 157.20-5 DIVISION INTO THREE WATCH REGULATION
CGD 78-037

This revision would require an adjustment in vessel manning requirements, to bring them *in line* with current legislation. It would change the requirements which identify personnel who must be

Continued on next page.....

used on the three watches and personnel who may be employed in a day working status. An NPRM is scheduled to be published on this docket in January 1980.

TANK VESSEL OPERATIONS REGULATIONS, PUGET SOUND CGD 78-041

This regulation governs the operation of tank vessels in the Puget Sound area. It was initiated to reduce the possibility of environmental harm resulting from oil spills in Puget Sound. This is to be accomplished by governing the operation of tankers and reducing the risk of collision or grounding.

Former Secretary of Transportation Brock Adams signed a 180-day Interim Rule on March 14, 1978 prohibiting entry of oil tankers in excess of 125,000 deadweight tons in Puget Sound; this appeared in the Federal Register of March 23, 1978 (43 FR 12257). An ANPRM was published March 27, 1978 (43 FR 12840). An extension of the interim rule was published in the Federal Register in order to allow the Coast Guard adequate time to complete this rulemaking.

The public hearings scheduled June 11 and 12 in Seattle, Washington, June 13 in Mt. Vernon, Washington, and June 14 in Port Angeles, Washington have been completed and all the comments received have been entered in the docket files for consideration. The extension of the interim navigation rule was published June 21, 1979 (44 FR 36174). This extension was effective July 1 and will be in effect until the Coast Guard prints notice of its cancellation. Copies of documents or the transcripts of the hearings may be obtained by writing to the Marine Safety Council. A final rule on the docket is currently expected in August 1980.

EIGHT-HOUR DAY VOLUNTARY OVERTIME CGD 78-146

This docket is a review of the Eight Hour Day, Voluntary Overtime regulation in 46 CFR 157.2010, which states that no licensed officer should be required to be on duty more than eight hours per day except in extraordinary circumstances. Existing regulations, however, do not address overtime or consider any possible "fatigue factor." Recent Coast Guard studies have shown that this factor has a profound effect on reaction time and judgement, therefore the regulation is currently being reviewed. An ANPRM is expected early in 1980.

PERSONNEL JOB SAFETY REQUIREMENTS FOR FIXED INSTALLATIONS ON THE OUTER CONTINENTAL SHELF CGD 79-077

This regulation is concerned with the health and safety requirements for installations and vessels engaged in oil field exploration and development. This action was mandated by pending Outer Continental Shelf legislation. It will provide more comprehensive protection for personnel employed in vessels and installations in the oil trade. the work plan received by the Marine Safety Council (MSC) in early July calls for an NPRM in January 1980.

SHIPBOARD NOISE ABATEMENT STANDARDS CGD 79-134

These standards will establish acceptable sound levels for each of the various vessel compartments based on the latest technology. The standards will differentiate acceptable sound levels for both existing vessels and new vessels, acceptable methods of compliance, and will establish a hearing conservation program.

During the development of these standards, the U.S. Naval Ocean Systems Center (NOSC), San Diego, California was contracted by the Coast Guard to evaluate sound levels aboard several U.S. merchant vessels, to study the data obtained, and then to define the extent of the noise problem. Based on this data and other information available, they were asked to recommend a set of noise levels to be used in the control and/or elimination of the shipboard noise problem for the proposed standards.

This study has been completed. Copies will be available through the National Technical Information Service (NTIS), Springfield, Virginia 22161 after January 1, 1980 or may be obtained by contacting Captain P. J. Danahy, Marine Safety Council (G-CMC/TP24), U.S. Coast Guard Headquarters, Washington, DC 20593.

PERSONNEL AND MANNING STANDARDS FOR FOREIGN VESSELS CGD 79-081

This regulation, deemed necessary to reduce the probability of oil spills, would establish minimum manning levels for foreign tank vessels operating in U.S. navigable waters. It would also establish procedures for the verification of training, qualification and watchkeeping standards. An NPRM is expected on the docket in January of 1980.

A complete listing of all Coast Guard regulations, both "significant" and "non-significant," appeared in the Monday, August 27, 1979 Federal Register (44 FR 50140).

THE COAST GUARD HAS NO PUBLIC HEARINGS SCHEDULED FOR JANUARY.

Fifth Annual 1980
Marine Safety Poster Contest

1st Prize GOLDEN SAFETY POSTER AWARD--To be presented at the 1980 National Safety Council Congress, in Chicago, Illinois

2nd Prize SILVER SAFETY POSTER AWARD--To be awarded to employer's representative attending the above Congress for eventual presentation to the 2nd Prize Winner.

3rd Prize SPECIAL GOLDEN SAFETY AWARD--Plaque to employer of First Prize winner to be awarded to corporate representative attending the above Congress as a thank you for their cooperation and interest in furthering safety in our industry.

RULES

1. Contest open to any and all employees in the marine industry, who like to draw. All posters must be on a Marine Safety subject. Any maritime operation or situation afloat or ashore may be used.

2. Confine drawing to 7½" x 10" on standard 8½" x 11" white paper, using either **black or red ink only. Draw for vertical display only.** We print from your artwork. Bold letters and strong art counts as well as subject matter. Emphasize only one idea.

3. Sign your work. Submission automatically gives copyright to Executive Committee Marine Section, National Safety Council and entrant releases all rights thereto.

4. Employer's name and address, as well as entrant's name, address and position, must be PRINTED and submitted with each entry.

5. All entries must be post marked on or before midnight, June 30, 1980. As many entries may be submitted as desired.

6. Winners will be notified via employer as soon as possible after closing date.

7. Carefully read and comply with all the above rules, and mail your entries to:

   Chairman, Audio/Visual Aids and Posters Committee
   c/o Ships' Operational Safety, Inc.
   284 Main Street
   Port Washington Harbor, NY 11050

OFFICIAL JUDGES

Elizabeth V. Stephens, Chairman
Vice President
Ships' Operational Safety, Inc.

Capt. Robert E. Hart
President
Marine Index Bureau, Inc.

Mr. Ted Alff
Vice Chairman
Audio/Visual Aids and Posters Committee

Mr. C. Bradford Mitchell
Maritime Consultant

Second Annual 1980 Marine Safety Photography Contest

Golden Safety Photography Award will be awarded to the person who submits the winning 35mm color slide. The award will be presented at the 1980 National Safety Council Congress, in Chicago, Illinois.

Sponsor's Golden Safety Award will be presented to employer of the winner in the color category, in appreciation for their cooperation and interest in furthering marine safety.

Silver Safety Photography Award will be awarded to the person who submits the winning black and white photograph. The award will be presented at the 1980 National Safety Council Congress, in Chicago, Illinois.

Sponsor's Silver Safety Award will be presented to a representative of the employer of the winning black and white photograph entry, in appreciation for their cooperation and interest in furthering marine safety training.

RULES

1. The photography contest is open to any and all employees in the maritime industry, who are photography buffs, either amateur or professional. All photography entries must be on a Marine Safety subject. The content should show a positive or negative safety topic. Give your picture a safety title, safety slogan or state the safety topic briefly and sign your entry. Any maritime operation or situation afloat or ashore may be used.

2. Color Category: Only 35mm slides will be acceptable. Your entry will be judged for content, composition, originality, safety applicability and pertinence.

3. Black and White Category: Glossy or matt prints 8" x10" or larger will be acceptable. Your entry will be judged for contrast, content, composition, originality, safety applicability and pertinence.

4. Sign your entry. Photographs and slides will not be returned. Submission automatically gives copyrights to Executive Committee, Marine Section, National Safety Council and entrant and sponsor release all rights thereto.

5. Employer's name and address, as well as entrant's name, address and position, must be PRINTED and submitted with entry.

6. All entries must be postmarked on or before midnight, June 30, 1980. As many entries in either the color or black and white category may be submitted as desired.

7. Winners will be notified via employer as soon as possible after closing date. The winners' names and companies will be published in the NSC, Marine Section newsletter.

8. Carefully read and comply with all the above rules, and mail your entries to:

Chairman, Audio/Visual Aids and Posters Committee
c/o Ships' Operational Safety, Inc.
284 Main Street
Port Washington Harbor, NY 11050

OFFICIAL JUDGES

Elizabeth V. Stephens, Chairman
Vice President
Ships' Operational Safety, Inc.

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Safety Director
Strachan Shipping Co.

Allan Litty
President
Flying Camera, Inc.

Bob Ahrens
President
Bob Ahrens Productions, Inc.

READEX FICHE

SHIP STRUCTURE COMMITTEE PUBLISHES 12 REPORTS IN 1979

The Ship Structure Committee, the interagency committee which sponsors research to improve the hull structures of ships and other marine structures by an extension of knowledge pertaining to design, materials and methods of construction, published 12 new reports during 1979. The committee has been in existence since 1946, when it was formed to investigate the structural failures of the Liberty ships. It has published nearly 300 technical reports on a variety of subjects since that time. The member organizations, in addition to the U.S. Coast Guard, are the U.S. Navy, the Maritime Administration, the Military Sealift Command, the American Bureau of Shipping and the U.S. Geological Survey.

The reports issued this last year are:

SSC-282 Comparison of Stresses Calculated Using the DAISY System to Those Measured on the SL-7 Containership Program by H. Y. Jan, K. T. Chang, and M. E. Wojnarowski

SSC-283 A Literature Survey on the Collision and Grounding Protection of Ships by N. Jones

SSC-284 Critical Evaluation of Low-Energy Ship Collision-Damage Theories and Design Methodologies - Volume I - Evaluation and Recommendations by P. R. Van Mater, Jr., and J. G. Gianotti

SSC-285 Critical Evaluation of Low-Energy Ship Collision-Damage Theories and Design Methodologies - Volume II - Literature Search and Review by P. R. Van Mater, Jr. and J. G. Giannotti

SSC-286 Results of the First Five "Data Years" of Extreme Stress Scratch Gauge Data Collection Aboard Sea-Land's SL-7's by R. A. Fain and E. T. Booth

SSC-287 Examination of Service and Stress Data of Three Ships for Development of Hull Girder Load Criteria by J. F. Dalzell, N. M. Maniar, and M. W. Hsu

SSC-288 The Effects of Varying Ship Hull Proportions and Hull Materials on Hull Flexibility, Bending and Vibratory Stresses by P. Y. Chang

SSC-289 A Method for Economic Trade-Offs of Alternate Ship Structural Materials by C. R. Jordan, J. B. Montgomery, R. P. Krumpen, and D. J. Woodley

SSC-290 Significance and Control of Lamellar Tearing of Steel Plate in the Shipbuilding Industry by J. Sommella

SSC-291 A Design Procedure for Minimizing Propeller-Induced Vibration in Hull Structural Elements by O. H. Burnside, D. D. Kana, and F. E. Reed

SSC-292 Report of Ship Vibration Symposium '78 by E. Scott Dillon

SSC-293 Underwater Nondestructive Testing of Ship Hull Welds by R. Youshaw and C. Dyer

For copies of these reports or an index of earlier reports, contact the Secretary, Ship Structure Committee, Office of Merchant Marine Safety (G-M/TP13), U.S. Coast Guard Headquarters, Washington, DC 20593.

MERCHANT MARINE PERSONNEL STATISTICS FY 79

Merchant Marine Officer Licenses Issued

Engineer

GRADE		ORIGINAL	RENEWAL
STEAM			
Chief Engineer:			
Unlimited		147	1,071
Limited		5	72
1st Assistant:			
Unlimited		229	402
Limited		2	30
2nd Assistant:			
Unlimited		358	537
Limited		8	9
3rd Assistant:			
Unlimited		778	771
Limited		2	17
	TOTAL	1,529	2,909
MOTOR			
Chief Engineer:			
Unlimited		126	281
Limited		41	179
1st Assistant:			
Unlimited		57	94
Limited		22	62
2nd Assistant:			
Unlimited		104	98
Limited		5	18
3rd Assistant:			
Unlimited		800	1,184
Limited		10	17
	TOTAL	1,165	1,933
Uninspected Vessels:			
Chief Engineer		261	143
Assistant		68	28
	TOTAL	329	171
	GRAND TOTAL		8,036

Merchant Marine Officer Licenses Issued

Deck

GRADE	ORIGINAL	RENEWAL
Master:		
Ocean	277	1,138
Coastwise	26	79
Great Lakes	32	90
Bays, sounds and lakes	55	195
Rivers	23	128
Chief Mate:		
Ocean	150	263
Coastwise	4	5
Great Lakes	0	0
Bays, sounds and lakes	2	0
Rivers	3	0
2nd Mate:		
Ocean	338	289
Coastwise	1	8
3rd Mate:		
Ocean	499	373
Coastwise	8	12
Pilots:		
Great Lakes	145	152
Bays, sounds and lakes	434	441
Rivers	285	375
Master (uninspected vessels)	485	385
Mate (uninspected vessels)	207	66
Motorboat Operator	4,880	3,701
Radio Officer	83	445
TOTAL	7,937	8,145
GRAND TOTAL	16,082	

Original Certificate of Registry as Staff Officers Issued

	ATLANTIC COAST	GREAT LAKES REGION	PACIFIC COAST	GULF COAST	TOTAL
Chief Purser	4	0	7	2	13
Purser	3	0	2	2	7
Senior Assistant Purser	1	0	6	1	8
Junior Assistant Purser	22	2	27	3	54
Surgeon	0	1	15	0	16
Radio Officer	8	2	3	1	14
Professional Nurse	13	1	4	0	18
Marine Physician	0	0	0	0	0
Others	6	0	0	0	6
TOTALS	57	6	64	9	136

Original Merchant Mariners Documents Issued

	ATLANTIC COAST	GREAT LAKES REGION	PACIFIC COAST	GULF COAST	TOTAL
October - December	1,345	486	715	1,813	4,359
January - March	1,742	659	878	2,155	5,434
April - June	2,862	951	1,327	2,327	7,467
July - September	1,927	752	977	2,055	5,711
TOTALS	7,876	2,848	3,897	8,350	22,971

Original and Additional Endorsements Issued

	ATLANTIC COAST	GREAT LAKES REGION	PACIFIC COAST	GULF COAST	TOTAL
AB - any waters, unlimited	303	68	161	470	1,002
AB - any waters, 12 months	439	126	164	396	1,125
AB - Great Lakes, 18 months	19	38	98	34	189
AB - other	137	35	122	151	445
Lifeboatman	469	32	310	256	1,067
Electrician	33	9	67	23	132
Oiler	293	129	197	133	752
Fireman-Watertender	290	115	124	140	669
Other QMED ratings	564	41	533	157	1,295
Tankerman	405	852	329	834	2,420
Entry-Steward	8,699	2,261	4,617	7,013	22,590
TOTALS	11,651	3,706	6,722	9,607	31,686

Towboat Operators Licenses Issued

	CANDIDATES	PASSED
Operator	1,879	1,060
2nd Class Operator	481	352
Endorsements	284	222
TOTAL	2,644	1,634

TOTAL LICENSES INCLUDING RENEWALS: 25,752

HELICOPTER EVACUATION AT SEA

By Lieutenant Commander D. R. Robbins
U.S. Coast Guard Air Station Chicago

LCDR Robbins presented his paper to the Marine Section of the 67th Annual National Safety Congress and Exposition, held in Chicago October 15-18, 1979.

THE HISTORY OF HELO RESCUE

When Igor Sikorsky developed the first successful helicopter in the early forties, one of his visions was that his aircraft could be used to save lives and relieve suffering. The first helicopter rescue at sea took place in 1945 when a barge foundered in Long Island Sound off Bridgeport, Connecticut. A helicopter from Sikorsky's Bridgeport plant flew out and rescued the two men who were clinging to the barge by lowering a rope to them.

The Coast Guard immediately recognized the potential of the helicopter as a rescue vehicle. We started working closely with Sikorsky and, in fact, had the first military helicopter pilot training school at Floyd Bennett Field, Brooklyn.

A great many advances have been made since those early days. The helicopters flown by the Coast Guard today are powered by jet engines, equipped with hydraulic hoists and are capable of landing on the water.

Both of our helicopters, the single engine H52 and the twin engine H3, are equipped with a rescue basket, specially rigged Stokes litter, a platform which is mounted in the door for water landing pick-ups, and flares, smoke floats, trail lines and blankets. The helicopters are thus able to proceed on a rescue mission at any time.

SHIPBOARD PREPARATION FOR EVACUATION

What should you do if one of your crewmembers becomes sick or injured at sea?

First, of course, attend to his immediate needs. Provide first aid, do whatever you can to make him comfortable and remove him from immediate danger.

Second, contact the Coast Guard. Be prepared to provide the following information:

The age and sex of the patient;
His breathing rate;
His pulse and blood pressure;
The patient's temperature;
A description of the injury or symptoms of the illness;
Past medical history;
Any treatment already started;
Whether or not the patient is ambulatory;
The position, course and speed of the vessel;
The estimated time of arrival at the next port;
The on scene weather conditions (include wind direction and speed, visibility, estimated cloud levels, seas and any precipitation);
The length and draft of your vessel.

Continued on next page.....

If any of this information is not readily available, do not delay contacting the Coast Guard! You can continue to gather the necessary data after notifying us.

SPECIAL NOTICE TO MARINERS

You should also be familiar with the Special Notice to Mariners, published annually, which contains general information about helicopter evacuations. This is summarized below for those who have not seen the notice.

Utilize accurate navigational information so that a rendezvous point may be properly designated by the Rescue Coordination Center.

Provide continuous radio guard on 156.8 MHZ (CH 16) FM or some other specific voice frequency. Keep the Coast Guard informed of any change to ETA at the rendezvous point.

Recommend the most suitable hoist area. When the hoist area has been determined, secure all loose gear, awnings and antenna wires. Trice up running rigging and booms. Provide firefighting equipment as available.

The vessel's course during a helicopter evacuation will generally be with the wind on the port bow, keeping the stack gases clear of the hoist area. The helicopter pilot will provide detailed instructions on both course and speed to be maintained by the vessel.

If the hoist will be made at night, light the pickup area as well as possible. DO NOT SHINE ANY LIGHTS ON THE HELICOPTER. This will blind the pilot. If there are any obstructions in the area, put a light on them so the pilot will be aware of their presence.

There will be a high noise level under the helicopter and voice communications will be almost impossible. Arrange a set of hand signals among the crew who will assist.

If possible, move the patient to, or as close to, the hoist area as his condition permits - TIME IS IMPORTANT!

If a basket is used, ALLOW THE BASKET TO TOUCH THE DECK PRIOR TO HANDLING to avoid severe shock. Be sure that the patient is strapped in the basket face up, and that he is wearing a life jacket if his condition permits.

When the crew and patient are ready for the hoist operation, signal the helicopter with "thumbs up."

NEVER SECURE THE CABLE TO THE VESSEL OR ATTEMPT TO MOVE THE BASKET WITHOUT UNHOOKING FROM THE CABLE.

If a trail line is attached to the basket, use it to steady the basket. Keep this line clear of feet.

USE COMMON SENSE

There are some other common sense items which should be remembered for a smooth evacuation.

Put the patient's identification papers, wallet, money, toilet articles, false teeth and any other items he might need in a bag or small suitcase which can be sent up with him on the hoist. Don't use a bag so large that a second hoist for it would be required. The helo may not have the time to spare on a second hoist.

Don't plan on sending anyone with the patient. The helo normally will not be able to take the extra weight; besides, we are not authorized to carry passengers.

If possible, keep someone near the radio and assign someone to act as messenger between the radio room and the hoisting area.

Keep radio transmissions to a minimum during the hoist.

COAST GUARD PREPARATION FOR EVACUATION

When your ship notifies the Coast Guard of a possible evacuation, the unit contacted will pass the information on to the Rescue Coordinating Center (RCC) which, in turn, will alert the closest appropriate rescue unit of a pending medical evacuation. At the same time, the RCC will pass the medical information on to a U.S. Public Health Service doctor for evaluation and recommendations. The doctor will probably have more questions about the patient's condition. You can expect at least a few communications back and forth before any decisions are made. While this delay may seem unnecessary to you, it is important. The doctor may decide that time is not of the essence and the patient will be better off waiting until you make port before being transferred, or he may feel that helo evacuation would be too risky. He may want a doctor or other trained medical personnel to see the patient before any evacuation is attempted.

While the doctor is making his decision, the rescue station is preparing the helicopter. The pilots will consider the distances involved, fuel requirements, weather enroute and on scene and the availability and need for medical crewmembers. Any aircraft is weight limited, and our helicopters are no exception. Weight is particularly important in the smaller H52 because every extra person equals half an hour of fuel. Therefore, careful consideration is given to the fuel, distance, and crew needed.

Once the decision has been made to evacuate the patient, the helo will proceed to an agreed upon rendezvous point. The ship will be sent the following message:

> A COAST GUARD HELICOPTER IS ENROUTE TO YOUR POSITION. IT IS SUGGESTED THAT YOU MAKE THE FOLLOWING PREPARATIONS TO ASSIST THE HELICOPTER IN EVACUATING YOUR CREWMAN. WHEN THE HELICOPTER ARRIVES IN YOUR AREA CHANGE COURSE INTO THE WIND AND

Continued on next page.....

HELICOPTER EVACUATION.....

CONTINUE AT STANDARD SPEED. THE HELICOPTER WILL PROVIDE THE BASKET FOR USE IN HOISTING THE PATIENT. DO NOT USE YOUR EQUIPMENT. DO NOT ALLOW YOUR CREWMEMBERS TO TOUCH THE BASKET UNTIL IT HAS GROUNDED ITSELF ON YOUR VESSEL. IF THE BASKET HAS TO BE MOVED TO THE PATIENT, FIRST UNHOOK IT FROM THE HOIST CABLE. DO NOT MOVE THE BASKET FROM BENEATH THE HELICOPTER WITH THE HOIST CABLE STILL ATTACHED. UPON REMOVAL OF THE HOIST CABLE DO NOT ATTACH IT TO ANY PART OF YOUR VESSEL. A CLEAR AREA FOR HOISTING IS MANDATORY. THE AFT/-CENTER SECTION OF YOUR VESSEL WILL PROBABLY BE THE BEST POSITION TO HOIST FROM. TAKE DOWN ALL POSSIBLE ANTENNAS, BOOMS, RIGGING, FLAGSTAFFS OR ANY OTHER OBSTRUCTIONS. THE HELICOPTER'S VOICE RADIO CALL IS COAST GUARD RESCUE _____. THE HELICOPTER WILL CONTACT YOU ON FREQUENCY _____ AND PASS FURTHER INSTRUCTIONS.

SEQUENCE OF EVENTS

The sequence of events during the hoist will be as follows:

The helo will arrive on scene and the pilot will evaluate the conditions and hoisting area. If it is decided to proceed with the hoist the helo crewman will direct the pilot into position over the hoisting area.

The helo crewman will lower a weighted line to the deck. One of the ship's crew should pull in this line and tend it. When all of the line is out of the helicopter the air crewman will attach the line to the hoist hook and lower the rescue rig, basket or litter to your deck. The trail line should be used to steady the rig and pull it to the ship.

Once the rig is on deck either disconnect the litter and take it to the patient or have the patient get into the basket. When the patient is safely in the rig, signal the air crewman and he will commence the hoist. Continue tending the trail line until the helo crewman has the rescue rig inside the helicopter and has taken in all the slack. Do not throw the line toward the helo but simply let go when you reach the bitter end.

TEAMWORK SPELLS SUCCESS

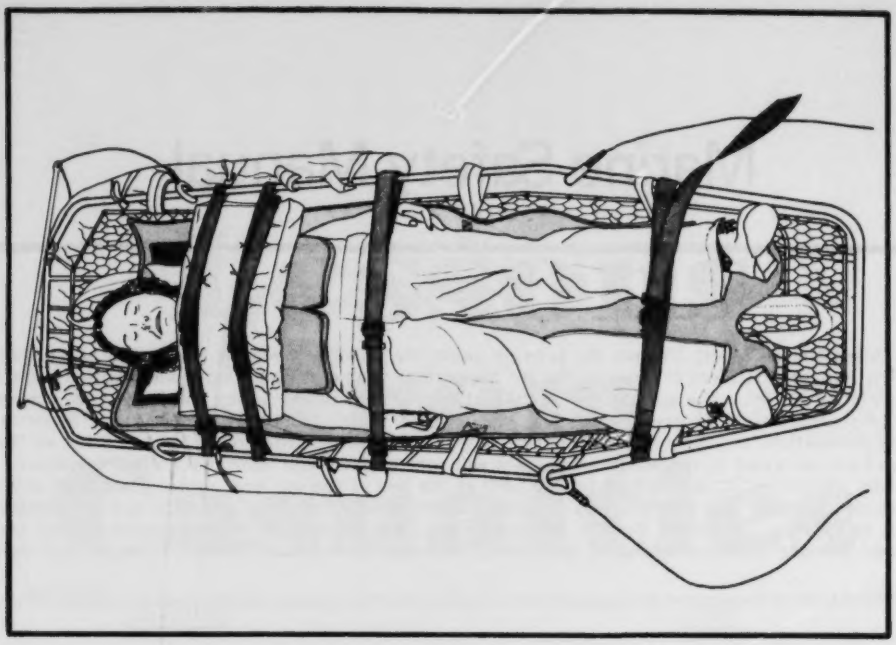
A helicopter rescue at sea can be a very difficult process, but with ship cooperation and assistance the rescue can be accomplished safely and expeditiously. Safety is the prime concern of the Coast Guard and, in particular, of the helo crew attempting the evacuation. We are no good to you or anyone else if we crash in the process. The ship's crew's assistance is essential in effecting a successful rescue.

About the Author

Lieutenant Commander Dennis R. Robbins originally enlisted in the Coast Guard in March 1964. After boot camp at Cape May and seven months as a seaman on the Coast Guard Cutter COOK INLET, he was selected to be in the first class of Aviation Cadets (AVCADS). He started flight training in Pensacola, Florida in January 1965 and completed the training in June 1966. He was then assigned to Air Station Los Angeles, and has since completed tours at air stations Mobile, Brooklyn, and Puerto Rico. At present, LCDR Robbins is stationed at USCG Air Station Chicago in Glenview, Illinois.

LCDR Robbins has flown both HH52A's and HH3F's, accumulating almost 4,000 flight hours. Besides flying missions in the Pacific, Atlantic, Gulf, Caribbean and Great Lakes he has flown from icebreakers in both the Arctic and Antarctic. He has participated in numerous helicopter medical evacuations, one as far as 500 miles offshore, and has been awarded a Coast Guard Achievement Medal and a Letter of Commendation for two of these efforts.

The Lieutenant Commander holds an AA in Sociology from Inter-American University of Puerto Rico, and will soon be receiving a BA.



These illustrations are attached to the rescue equipment lowered from Coast Guard helicopters so that its proper use is obvious at a glance.

Marine Safety Manual

The Coast Guard Marine Safety Manual, the primary policy statement concerning the marine safety functions of Captains of the Port and Officers in Charge, Marine Inspection, is now available on a subscription basis from the Government Printing Office. The purpose of the manual is to document the policy and procedures concerning the entire scope of marine safety programs, including Commercial Vessel Safety, Port Safety and Security, Marine Environmental Protection, and Recreational Boating Safety. The subscription period will run for an "indefinite" period (no less than one year) during which subscribers will receive the basic manual(s) and all subsequent changes. Renewal notices will be sent to subscribers by the GPO at the end of the one year period along with any notice of price increase/decrease for the service. As an added convenience, individual volumes and/or changes may be subscribed to separately. Requests for the service should be addressed to the Superintendent of Documents, U.S.Government Printing Office, Washington, DC 20402. Subscription fees for the basic manual(s) and changes are:

SUBSCRIPTION SYMBOL	TITLE	PRICES DOMESTIC	FOREIGN
MSM 01	Volume I--Administration and Management	$11.00	$13.75
MSM 02	Volume II--Material Inspection	7.50	9.40
MSM 03	Volume III--Marine Industry Personnel	7.00	8.75
MSM 05	Volume V--Investigations	7.00	8.75
MSM 06	Volume VI--Ports and Waterways Activities	6.00	7.50
MSM 07	Volume VII--Index	7.25	9.10
	TOTAL	$45.75	$57.25

Subscription services for CHANGES ONLY (for holders of the basic volumes):

TITLE	PRICES DOMESTIC	FOREIGN
MSM 01 CHANGES	$ 9.00	$11.25
MSM 02 CHANGES	6.00	7.50
MSM 03 CHANGES	5.00	6.25
MSM 05 CHANGES	4.25	5.35
MSM 06 CHANGES	4.25	5.35
TOTAL	$28.50	$35.50

Lessons from Casualties

An 18,000 gross ton American tankship sustained a fire in the after pumproom while dischargine a cargo of heating oil, gasoline, and jet fuel. The vessel was moored at a Jacksonville, Florida terminal at the time.

During the cargo transfer, two pumps were being used to discharge regular gasoline. A third cargo pump was started soon after, which discharged jet fuel. All pumps were adjusted to maintain a discharge pressure of 70 psig. The chief mate toured the weather deck and checked all connections for leaks. At the same time the pumpman went to the lower level of the pumproom and checked the cargo pumps. An AB was maintaining a watch on the weather deck. Everything was proceeding normally.

The AB on the weatherdeck heard a sound like a "pop" which caused him to look aft. He saw heavy white smoke coming out from the pumproom exhaust at the top of the port king post. The AB ran to the ship's office and reported this to the chief mate, who called the engineroom and ordered all cargo pumps to shut down. He then went out on deck, told the terminal employee on the pier he had shut down and that the fire department should be called. He instructed the AB to close all cargo line valves. The chief mate proceeded to the pumproom door and saw heavy smoke in the lower level of the pumproom. He did not see any flames. The chief mate, pumpman, quartermaster, and the AB shut down the ventilation blowers, room doors, opened the steam smothering line, and discharged CO_2 through the fixed system to the pumproom. Meanwhile, the chief engineer had the fire and foam pumps started, put pressure on the fire and foam mains and had the engineroom fire hoses run out. He then checked the engineroom forward bulkhead, which is common with the pumproom and the ajoining settler tank bulkheads, for heat. None of the bulkheads were found to be hot.

After the fire department arrived, it was determined that the fire had been extinguished with little damage. No positive source of ignition was found, but a possible source was the failure of the flinger ring located at the after bearing on the No. 3 cargo pump. It was found to be fractured and parts were missing.

This casualty demonstrates the vital importance of ship's personnel being trained in emergency procedures on tankers. If this fire had not been handled as quickly and efficiently as in this case, a major marine catastrophe might have resulted. Adequate shipboard emergency fire procedures, especially on board tankers, cannot be stressed enough.

ENGINEROOM ABLAZE!

Oil "Burp" Ignites Aboard MV MARY TURECAMO

On August 9, 1979, during completion of fueling operations on the MV MARY TURECAMO, an overflow of fuel oil caused an engineroom fire which resulted in extensive damage. Fortunately, no one was injured.

MV MARY TURECAMO

The MARY TURECAMO was built in Cohoes, New York in 1972 and is homeported in Wilmington, Delaware. She is a towing vessel of 263 gross tons, 96.6 feet long with a breadth of 28.1 feet.

The vessel's fuel oil tanks are located in the forward part of the engineroom, integral to the hull, with a capacity of 22,000 gallons each. They are constructed from a single tank, which is divided at the vessel's center line by an oil tight bulkhead. This tank extends from the port side shell to the starboard side shell and from the bottom to a height of about 5 feet. The top of the tank is approximately 3 feet below the engineroom overhead. There are two 1½-inch fill lines, one for the port tank and one for the starboard tank, and a 4-inch vent line for each tank which terminates on the weather deck. There is also a 1½-inch sounding tube for each tank located in the engineroom at the top of the tank. The sounding tube extends approximately 8 inches above the tank and is equipped with a spring loaded gate valve.

SCENE OF THE FIRE

On August 9, the MARY TURECAMO was moored at the Exxon Terminal, Con-Hook, New Jersey, unloading Number 2 oil into its main fuel oil tanks. The fueling operation was being conducted by the vessel's Chief Engineer. The weather at the time was clear, with no appreciable winds and an air temperature of 78 degrees F.

Nearing the end of fueling operations, the Chief Engineer gauged the tank and found the fuel level to be about 8 inches from the top. He then proceeded to the main deck and gave the order to the dockman to shut down. Suddenly, he noticed smoke emerging from the engineroom! Running to the space, he saw that there were flames in the forward part of the engineroom near the fuel oil tanks.

FIGHTING THE FIRE

Firefighting efforts commenced immediately. The contents of two 15-pound CO_2 portable extinguishers were applied to the fire; an attempt to use another extinguisher revealed that it was empty with its seal intact. When it became evident that the portable extinguishers were not sufficient to control the fire, the Chief Engineer attempted to actuate the engineroom fixed CO_2 system via the remote cable pull box located on the starboard side of the deck house. However, none of the CO_2 bottles connected to this would discharge, until local control finally caused discharge of one of the pressure actuated CO_2 bottles. At this point the Chief Engineer notified the dockman to contact the local fire department.

The Bayonne, New Jersey fire department responded immediately and was on scene in an estimated five minutes. The fire was brought under control and extinguished several hours later. The vessel was towed to the Turecamo facility in Staten Island for repairs.

Subsequent examination of the firefighting equipment revealed that the fixed CO_2 system consisted of five 50-pound CO_2 bottles connected to fixed piping and designed to flood all areas of the engineroom. Three bottles were designed to be actuated by a pull cable located on the starboard side of the deckhouse, which would then actuate by pressure the remaining two bottles. These three bottles were found to be empty, and one of the two pressure actuated bottles was also empty. The valves which actuate the three CO_2 bottles by use of the pull cables were found to be in the open position. In general, the valves were not easily operated and the pressure actuated ventilation shutdown switch was frozen in the "on" position. How-

Continued on next page.....

MV MARY TURECAMO.....

ever, the quantity of the fire-fighting equipment which was in good order was sufficient to comply with the provisions of 46 CFR 25.30.

POST-CASUALTY EXAMINATION

Two 1,450 horsepower diesel engines, two ships' service diesel generators, an oil fired water heater and associated pumps and electrical motors are located in the vessel's engineroom. Four electrical motors are located on the top of the fuel oil tank, which operate pumps for the potable water, sanitary water and refrigeration/air conditioning system. Upon examination of the vessel on August 10, the sanitary water pump motor inspection plate was found to be missing, exposing the windings and brushes. The sounding tubes for the fuel oil tanks each had a sounding tape in the tube, holding the spring loaded gate valve in an open position. The level of oil in the fuel oil tanks was approximately 2 inches from the top of the tank.

The Chief Engineer stated that at the time of the casualty the main engines were secured, one ship's service generator was operating, the oil fired water heater was secured and the potable and sanitary water pumps were operating in the automatic mode. All other machinery was secured.

Damage to the vessel consisted of warped and buckled deck and side shell plating over an area of approximately 200 square feet. About 40 percent of the wiring in the engine room was destroyed, and various motors and controllers required replacement due to fire-fighting water damage.

CONCLUSIONS

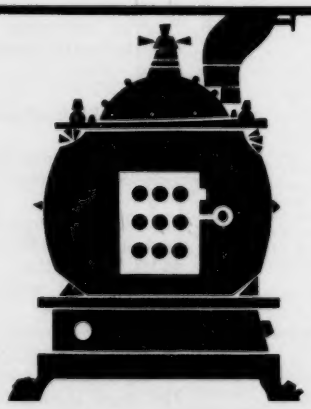
The proximate cause of the casualty was an overflow of oil from the two main fuel tanks which was subsequently ignited by an unknown source, probably one of several electrical motors in the vicinity of the overflow.

Due to the level of oil in the tank after the fire, it is concluded that the overflow from the sounding tubes was due to a "burp" of oil from the tank. This oil was ignited, and as a result heated the fuel oil tank sufficiently to produce fumes which, coupled with normal accumulation of bilge oil, continued to fuel the fire.

The fixed CO2 system was not completely operational at the time of the casualty (three of the bottles were not fully charged) which contributed to the severity of the fire.

The fact that the sounding tubes for the fuel oil tanks are located in the engine room was a contributing factor to both the cause and severity of the casualty. There is no evidence that personnel negligence or equipment failure contributed to the cause of this casualty.

This accident provides much food for thought and ideas for an evaluation of your own vessel and equipment. Will your CO_2 bottles work? Are they charged?[2] How do you know? Can fuel overflow/leak into the engineering spaces? Are any unnecessary ignition sources present? Are spring loaded valves broken or blocked? A careful look around may reveal some potential safety oversights that are much easier to correct now than to provide for extensive repairs after the fact. This accident involved no personal injuries, but . . . .



WINTER ENERGY QUIZ

1. The easiest part of the house for do-it-yourself insulation is:
(a) interior walls; **(c) attic;**
(b) exterior walls; **(d) duct-work.**

2. Don't bother to insulate:
(a) crawl space under floors; **(c) hot water pipes;**
(b) floors over garage; **(d) cold water pipes.**

3. The easiest way to test windows and doors for air tightness is to:
(a) put your hand against the glass or wood; **(c) turn the heat off during a cold spell;**
(b) move a lighted candle around the frames and sashes; **(d) check to see if the weatherstripping is smooth.**

4. If only 1,000 homes were better insulated, caulked and weather-stripped, how many homes could be supplied with natural gas from the energy saved?
(a) 123; **(b) 368;** **(c) 539.**

ANSWERS:
(1) c, (2) d, (3) b, (4) c. (Source: Dept. of Energy)

Nautical Queries

The following items are examples of questions included in the Third Mate through Master examinations and the Third Assistant Engineer through Chief Engineer examinations.

DECK

(1) An eye splice made in any wire rope used as cargo gear without a thimble shall have at least

A. two tucks with whole strands.
B. three tucks with whole strands.
C. four tucks with whole strands.
D. five tucks with whole strands.

REFERENCE: 46 CFR 91.37-50

(2) For most models, compensating the master gyrocompass for small permanent errors can be accomplished by adjusting the

A. azimuth motor.
B. collector rings.
C. lubber line plate.
D. vertical ring.

REFERENCE: Dutton, 13th Ed.

(3) On a magnetic chart, the line of zero variation is the

A. zero variation line.
B. isagonic line.
C. variation line.
D. agonic line.

REFERENCE: Dutton 13th Ed.

(4) If two falls are attached to lift a one ton load, what angle between the falls will result in the stress on each fall being equal to the load being lifted?

A. 60 degrees
B. 75 degrees
C. 120 degrees
D. 150 degrees

REFERENCE: Marine Cargo Operations, Sauerbier

(5) The process of using timbers to secure cargo by running the timber from an upper support down to the cargo either vertically or at an angle is known as

A. bracing.
B. tomming.
C. shoring.
D. dunnaging.

REFERENCE: Marine Cargo Operations, Sauerbier

ENGINEER

(1) The load is always placed on the lower half of the main bearings in a

I. two-stroke cycle engine.
II. four-stroke cycle engine.

A. I only
B. II only
C. Both I and II
D. Neither I nor II

REFERENCE: Engineman 3 and 2

(2) If the plunger in a jerk pump is rotated until the release port stays uncovered all the time

A. no fuel will be delivered.
B. the maximum effective stroke will be attained.
C. the fuel delivered to the cylinder will be excessive.
D. the injection nozzle will overheat and carbonize.

REFERENCE: Maleev

(3) In a fire tube auxiliary boiler you would expect to find the thickest scale on the waterside of the

I. crown sheet.
II. through stays.

A. I only
B. II only
C. Either I or II
D. Neither I nor II

REFERENCE: Osbourne

(4) In a flash type evaporator, if the sea feed temperature is 150 degrees and the salt content of the distillate is 0.35 grains per gallon, the three way solenoid trip valve will direct the distillate to the

A. fresh water tanks.
B. reserve feed tanks.
C. distilled water tanks.
D. bilge.

REFERENCE: Engineman 3 and 2

(5) Which statement is true concerning Bunker C vapors?

A. The vapor cannot be ignited by a spark unless the vapor is at its flash point.
B. The vapor is nontoxic in all concentrations.
C. The vapor cannot be ignited by a spark unless it is at its autoignition temperature.
D. The vapor is heavier than air.

REFERENCE: CG-174

ANSWERS

Deck
1. B; 2. C; 3. D; 4. C; 5. B

Engineer
1. A; 2. A; 3. A; 4. D; 5. D

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications may be obtained from the nearest marine safety office, marine inspection office or by writing: **Commandant (G-CMA/TP26), U.S. Coast Guard, Washington, DC 20593.** Because changes to the rules and regulations are made from time to time, these publications can be kept current between revisions only by referring to the Federal Register. (Official changes to all Coast Guard authored federal regulations are published as final rules in the Federal Register on Mondays or Thursdays.) Following the title of each publication in the table below are the dates of the most recent editions and changes, if any.

The Federal Register may be obtained by subscription ($5 per month or $50 per year) or by individual copy (75 cents each) from SupDocs, U.S. Government Printing Office, Washington, DC 20402.

CG No.	TITLE OF PUBLICATION
CG-101-1	Specimen Examinations for Merchant Marine Deck Officers (2nd and 3rd Mate) (4-1-77).
CG-101-2	Specimen Examinations for Merchant Marine Deck Officers (Master and Chief Mate) (7-1-78).
CG-108	Rules and Regulations for Military Explosives and Hazardous Munitions (4-1-72). FR 7-21-72, 12-1-72, 6-18-75.
CG-115	Marine Engineering Regulations (8-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78, 3-12-79, 5-3-79.
CG-123	Rules and Regulations for Tank Vessels (8-1-77). Ch-1, 4-78. FR 8-18-77, 9-12-77, 9-26-77, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79, 11-19-79.
CG-169	Navigation Rules - International - Inland (5-1-77). FR 7-11-77, 7-14-77, 9-26-77, 10-12-77, 11-3-77, 12-6-77, 12-15-77, 3-16-78.
CG-169-1	Colregs Demarcation Lines (7-15-77).
CG-172	Rules of the Road - Great Lakes (7-1-72). FR 10-6-72, 11-4-72, 1-16-73, 1-29-73, 5-8-73, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 1-13-77, 11-3-77, 12-6-77.
CG-174	Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products (9-1-76).
CG-175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3-1-73).
** CG-176	Load Line Regulations (2-1-71). FR 10-1-71, 5-10-73, 7-10-74, 10-14-75, 12-8-75, 1-8-76.
CG-177	Yacht Admeasurement and Documentation (9-72).
CG-182-1	Specimen Examinations for Merchant Marine Engineers License (2nd and 3rd Assistant) (4-75).
CG-182-2	Specimen Examinations for Merchant Marine Engineer Licenses; First Assistant Engineer, Steam and Motor, any Horsepower (4-76).
CG-182-3	Specimen Examinations for Merchant Marine Engineer Licenses; Chief Engineer Steam and Motor, any Horsepower (4-76).
CG-184	Rules of the Road--Western Rivers (8-1-72). FR 9-12-72, 12-28-72, 3-8-74, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 3-1-76, 6-10-76, 7-11-77, 12-6-77, 12-15-77.
• CG-190	Equipment Lists (8-1-77).
CG-191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (11-1-76). FR 3-3-77, 8-8-77, 4-9-79.
CG-227	Laws Governing Marine Inspection (7-1-75).
CG-239	Security of Vessels and Waterfront Facilities (5-1-74). FR 5-15-74, 5-24-74, 8-15-74, 9-5-74, 9-9-74, 12-3-74, 1-6-75, 1-29-75, 4-22-75, 7-2-75, 7-7-75, 7-24-75, 10-1-75, 10-8-75, 6-3-76, 9-27-76, 2-3-77, 3-31-77, 7-14-77, 7-28-77, 9-22-77, 9-26-77, 12-19-77, 1-6-78, 1-16-78, 3-2-78, 11-16-78, 1-22-79, 1-25-79, 2-12-79, 11-5-79.
CG-242	International Conventions & Conferences on Marine Safety (6-51).
• CG-257	Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-77). Ch-1, 3-17-78. FR 9-26-77, 10-10-78, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79.
CG-258	Rules and Regulations for Uninspected Vessels (4-77). Ch-1, 3-17-78. FR 6-14-79, 7-2-79.
CG-259	Electrical Engineering Regulations (7-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78.
CG-268	Rules and Regulations for Manning of Vessels (7-1-77). FR 11-19-79.
CG-293	Miscellaneous Electrical Equipment List (6-73).
CG-323	Rules and Regulations for Small Passenger Vessels (7-1-77). Ch-1 3-17-78. FR 10-25-77, 7-17-78, 3-12-79, 6-14-79, 7-2-79.
CG-329	Fire Fighting Manual for Tank Vessels (1-1-74).
CG-388	Chemical Data Guide for Bulk Shipment by Water (1976).
CG-403	Great Lakes Pilotage Regulations (7-76).
CG-439	Bridge to Bridge Radiotelephone Communications (12-1-72). FR 12-28-72, 3-8-74, 5-5-75, 7-11-77.
CG-467	Specimen Examinations for Uninspected Towing Vessel Operators (10-1-74).
CG-474	When You Enter That Cargo Tank (3-76).
CG-478	Liquefied Natural Gas, Views and Practices, Policy and Safety (2-76).
CG-480	Oil Pollution Control for Tankermen (6-75).
CG-482	Benzene Safe Handling Practices (12-76).
CG-486	Shippers Guide to Hazardous Materials Regulations (Water Mode) (8-77).
CG-491	Safety for Small Passenger Vessels (8-77).
OLD CG-497,	Rules and Regulations for Recreational Boating (12-78), now M 16752.2 (12-78) FR 7-19-79.
*** CG-515	Rules and Regulations for Foreign Vessels Operating in the Navigable Waters of the U.S. (2-78). FR 1976--7-8, 8-26, 9-16, 9-20, 12-13. 1977--1-3, 3-31, 5-19, 6-16, 7-7, 7-14, 7-21, 7-25, 8-4, 8-11, 9-8, 9-12, 9-22, 9-26, 9-29, 11-10, 12-8, 12-15, 12-19. 1978--4-6, 5-18, 5-22, 6-29, 7-24, 9-25, 11-16, 11-20, 11-30, 12-7, 12-28. 1979--1-22, 1-25, 2-5, 2-12, 2-26, 3-29, 4-12, 4-16, 5-3, 5-7, 5-31, 6-14, 8-2, 8-16, 8-27, 9-4, 9-24, 10-15, 10-18, 11-1, 11-5, 11-19.
CG-518	Marine Investigating Officer's Regulations Handbook (2-78). FR 2-16-78, 4-27-78, 5-25-78, 6-15-78, 9-25-78, 10-19-78, 11-20-78, 1-25-79, 7-19-79, 9-4-79.
CG-526	Utilizing the Packaged Hazardous Materials Regulations, 49 CFR (5-78).
Safety of Life at Sea:	Convention, with Regulations, London, June 17, 1960.
Specifications for	Merchant Vessel Equipment (Subparts of Chapter Q, 46 CFR, parts 160 to 164.

*Temporarily out of stock
**Under revision--can be found in Title 46 CFR Parts 41-69
***Available only through the Superintendent of Documents

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OF THE MARINE SAFETY COUNCIL

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Commandant

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cover

The EL PASO ARZEW is a 125,000 M^3 LNG carrier. While enroute from Savannah, Georgia to Arzew, Algeria last summer, her officers and crew decided to maneuver both the Navy and Coast Guard methods of the Williamson Turn for the sake of comparison. Captain James Stilwell, Master, reports on their findings beginning on page 31.

maritime sidelights

SHIP SAFETY
ACHIEVEMENT CONTEST

The American Institute of Merchant Shipping and the Marine Section of the National Safety Council have announced a Ship Safety Achievement Awards Contest for American flag merchant ships, including barge and towing vessels, which have performed outstanding feats of safety in the course of the calendar year ending December 31, 1979.

Entries will be accepted until February 22 and should be sent to Barbara D. Burke, Director of Public and Legislative Affairs, American Institute of Merchant Shipping, 1625 K Street NW, Suite 1000, Washington, DC 20006.

CERTIFICATES OF
FINANCIAL RESPONSIBILITY

Several questions have arisen recently from the maritime industry concerning Certificates of Financial Responsibility (COFR).

The purpose of this section of the law is to insure that each vessel using U.S. waters will have sufficient financial resources to indemnify the taxpayers of the United States against removal costs up to $150 per gross ton or $14 million, whichever is lesser, when that vessel is responsible for removal costs.

The regulations concerning the COFR's apply to all vessels using any port or place in the United States or the navigable waters of the United States except (1) vessels which are 300 gross tons or less, (2) non-self-propelled barges which do not carry oil or hazardous substances as cargo or fuel, and (3) public vessels. The COFR is required in order for the owner or operator of the vessel to provide evidence that he possesses the resources to meet his liability to the United States in case of an accident in which oil or hazardous material spilled from the vessel must be cleaned up.

Before a vessel is allowed to enter the navigable waters of the United States, the Captain of the Port will check to ensure that a valid COFR for the vessel does exist. If the vessel does not have a COFR, or if its COFR is not current, the vessel will be denied entry to U.S. navigable waters or otherwise restricted in her activities until a valid COFR is obtained. Oil transfer operations will not be permitted in the absence of a valid COFR.

Details on Certificates of Financial Responsibility can be found in 46 CFR 542.

Reprinted from the U.S.C.G. Marine Safety Newsletter, Houston

NEW GUIDE FOR TANKER
AND TERMINAL SAFETY

A new book entitled "International Safety Guide for Oil Tankers and Terminals" has been published jointly by the International Chamber of Shipping (ICS) and the Oil Companies International Marine Forum (OCIMF). This important work combines and updates the contents of the separately published "Tanker Safety Guide (Petroleum)" by ICS and the "International Oil Tanker and Terminal Safety Guide" by OCIMF.

The new book consists of two parts. Part 1 covers operational procedures and safe practices. Part 2 provides additional information and supporting reasons for guidance given in Part 1.

This text is generally accepted worldwide as an industry standard for tanker safety and is carried on board many oil tankers. Further, the Maritime Safety Committee of IMCO has acknowledged it as a significant contribution toward tanker safety. A second edition of the "Clean Seas Guide for Oil Tankers" by the same authors has also been published. This text is referenced in 33 CFR 157.23. Copies may be obtained from:

New York Nautical Instrument
and Service Corporation
140 W. Broadway
New York, NY 10013

The International Safety Guide costs $45.00 plus postage; the Clean Seas guide is available for $4.50 plus postage. Copies are also available from Witherby and Company, Ltd., 32-36 Aylesbury Steet, London, EC1R OET, England for £ 18 and £ 2, respectively.

This month's list of proposed and final rules published in the Federal Register is not as large as that of last month. Of particular interest are the final rules on Marine Investigation and Revocation Proceedings, CGD 79-080, which were published on January 10, 1980 and will become effective on February 11, 1980. These regulations, together with CGD 77-168, Navigation Safety Regulations for Electronic Navigation Devices, comprise the highlights of the Coast Guard's regulatory efforts since the last issue. Aside from these, the only other final rules published pertain to boating safety. These rules are the Ventilation Standards, CGD 76-082 and 76-082A, published on December 17, 1979 and CGD 78-034, Display of Capacity Information On Boats, published on January 10, 1980.

Of the proposed rules, two, published on January 7, 1980, pertain to the Great Lakes. These are the proposed rules for Great Lakes Pilotage, CGD 79-138, and those for Tank Vent Piping on Great Lakes Vessels, CGD 79-083. The other proposed rule published pertains to Standards for Offshore Crane Design, Inspection, Testing, Operation and Operator Qualifications. This rule was published on January 10, 1980.

The Marine Safety Council has received several requests for reprints of the final rule on the Pollution Prevention Regulations (CGD 75-124A). This rule, ex-

Continued on next page.....

pected in January, has hit a snag in our legal department on clearance. We are promised that it should clear shortly and most probably will be published by the time you receive this issue. Requests for reprints of this final rule, as is the case with any reprint which is unavailable when a request is received, will be placed on file and filled as soon as the material is available. If you have requested and not received a copy of an article which has not yet been published, a second request is not necessary.

Any questions regarding regulatory dockets or companies and individuals wishing to speak at public hearings should notify Capt. P. J. Danahy (G-CMC/24), U.S. Coast Guard Headquarters, 2100 Second St. SW, Washington, DC 20593; (202)426-1477.

* * *

QUALIFICATIONS OF THE PERSON IN CHARGE OF OIL TRANSFER OPERATIONS, TANKERMAN REQUIREMENTS CGD 74-44, 74-44a

These regulations will redefine and establish qualifying criteria for the certifying of individuals engaged in the carriage and transfer of dangerous cargoes in bulk.

It has been found that most pollution incidents are the result of personnel error; consequently, the minimum qualifications of persons involved in handling polluting substances should be specified.

As stated in the last issue, these projects have been withdrawn (44 FR 25243). New NPRM's which were anticipated in June have been delayed and are now scheduled for publication in April of this year under new Coast Guard docket numbers 79-116 and 79-116a.

REVISION OF ELECTRICAL REGULATIONS CGD 74-125

This regulation will constitute a general revision and updating of the electrical regulations to conform with latest technology. It will include steering requirements for vessels other than tank vessels.

This revision is occurring because industrial standards for electrical engineering have changed in the past few years, and the regulations must be brought up to date to reflect current industry practices.

An initial NPRM was published on June 27, 1977 (42 FR 32700). A supplemental NPRM will be issued early in 1980.

NEW TANK BARGE CONSTRUCTION CGD 75-083 UPGRADE OF EXISTING TANK BARGE CONSTRUCTION CGD 75-083a

This action is comprised of two regulatory projects centered on tank barge construction standards. These projects were the result of a Presidential initiative of March 17, 1977, directing a study of the tank barge pollution problem. One project will address new barge construction while the other will pertain to existing barges. Regulatory documents for both will be published at the same time and joint public hearings have been held.

In July 1977, the Coast Guard began a reexamination of the tank barge construction standards. It was determined that new construction would be treated separately from existing barges. An advanced notice of proposed rulemaking (ANPRM) was then issued to gather additional data and assess impacts related to existing barges.

The new NPRM on tank barge construction, withdrawing the prior NPRM and the ANPRM for existing tank barges, was published as part VI of the June 14, 1979 Federal Register (44 FR 34440 and 44 FR 34443, respectively).

Public hearings were held on the dockets as follows: August 2, 1979, Washington, DC; August 15, 1979, Seattle, WA; August 23, 1979, New Orleans, LA; September 5, 1979, Washington, DC; and September 7, 1979, St. Louis, MO. The comments given at the hearings have been incorporated in the docket.

On Thursday, November 8, 1979 a Federal Register notice extended the comment period on the project. This extension was based on the continued public interest and ran to December 1, 1979.

This extension has expired and no further comments will be accepted. A final rule on Tank Barge Construction (CGD 75-083) is presently anticipated in June of 1980 and an NPRM on Existing Tank Barges (CGD 75-083A) is scheduled for April of the same year.

Anyone wishing to obtain copies of the rulemaking may do so by contacting Capt. P. J. Danahy, Marine Safety Council (address is given in the introduction to the Keynotes section).

POLLUTION PREVENTION, VESSELS AND OIL TRANSFER REGULATIONS CGD 75-124a

This regulation would reduce accidental or intentional discharge of oil or oily wastes during vessel operations.

The basis of this regulation is threefold. First, there is the need to reduce the number and incidence of oil spills. Second, this regulation will help to clarify the existing rules. Finally, this regulation covers the additional requirement for oil-water separators under the 1973 International Convention for the Prevention of Pollution from Ships.

The NPRM was published on June 27, 1977 (42 FR 32670). A supplemental NPRM was published October 27, 1977 (42 FR 56625). The draft of the final rule is under review by the Coast Guard legal office and is scheduled to appear in late January or early February 1980.

DESIGN AND APPROVAL REQUIREMENTS FOR OIL POLLUTION PREVENTION EQUIPMENT CGD 76-088a

These regulations set out specifications and procedures for approving oil-water separators, cargo monitors, bilge monitors and bilge alarms for use on merchant

Continued on next page.....

vessels. They are based upon international design and test specifications adopted by the International Maritime Consultative Organization (IMCO) as Resolution A-393X, and provide standards for equipment that is representative of the best technology presently available.

The final rule, published in the September 13, 1979 Federal Register (44 FR 53352), requires that performance testing of prospective equipment must be done by one of the independent testing laboratories designated by the Commandant (G-MMT). The following laboratories have received authorization to commence testing:

Underwriters Laboratories
Tampa, Florida, USA

National Sanitation Foundation
Ann Arbor, Michigan, USA

University of New Castle
New Castle Upon Tyne, UK

The following three regulations, CGD 77-057, CGD 77-058(b)(c)(d), and CGD 77-063, make up the Tanker Safety and Pollution Prevention (TSPP) Regulations. Public hearings have been held on the package, comments were requested and 541 have been received. A notice of delay in publishing the final regulations was published in the June 7, 1979 Federal Register (43 FR 32713). Final rules have been published and appeared in the November 19, 1979 Federal Register (44 FR 66500).

INERT GAS SYSTEM
CGD 77-057

This regulation would require certain oil tankers of 20,000 deadweight tons and over to be fitted with inert gas systems.

As part of the President's initiatives to reduce marine pollution, this regulation will reduce the possibility of in-tank explosions which have been the cause of some pollution incidents.

The Inflationary Impact Statement for this regulation was completed in May 1977. An NPRM was published February 12, 1979 (44 FR 8984). Hearings were held March 21, 1979 in Washington, DC and March 28, 1979 in San Francisco, CA; 136 comments were received, have been evaluated, and the final rule has been published.

SEGREGATED BALLAST AND TANK CLEANING REGULATIONS
GCD 77-058(b), (c) and (d)

This four-part regulation was initiated when President Carter directed the Secretary of Transportation to issue new rules for oil tanker standards, which were to include segregated ballast on all tankers and double bottoms on all new tankers which call at American ports. The provisions of these proposed regulations have been changed by the February 1978 Intergovernmental Maritime Consultative Organization (IMCO) Conference to include Crude Oil Washing (COW) and Clean Ballast Tanks (CBT).

The NPRM was published May 16, 1977 (42 FR 24868). As a result of the IMCO Tanker and Pollution Prevention Conference of February 1978, a new NPRM was issued on February 12, 1979 (44 FR 8984). Public hearings were then held in March in Washington, DC and San Francisco, CA; 265 comments were received on the docket, and were analyzed and the final rules were formulated. These rules appeared in the Federal Register of November 19, 1979.

STEERING GEAR DESIGN STANDARDS TO PROVIDE REDUNDANCY
CGD 77-063

As part of the President's initiatives to reduce pollution, this regulation is needed to help reduce the possibility of a marine collision due to a loss of steering.

An NPRM was published May 16, 1977 (42 FR 24869). As a result of the IMCO Tanker Safety and Pollution Prevention Conference of February 1978, a new NPRM was issued on February 12, 1979 (44 FR 8984). Public hearings were held on the docket and 138 comments have been received and analyzed and the final rules have been published.

CONSTRUCTION AND EQUIPMENT EXISTING SELF-PROPELLED VESSELS CARRYING BULK LIQUEFIED GASES
CGD 77-069

These regulations would amend the current ones to include the substantive requirements of the "Code for Existing Ships Carrying Liquefied Gases in Bulk," adopted by the Intergovernmental Maritime Consultative Organization (IMCO). The use of liquefied gas has increased, as have the problems associated with it. Due to its unique properties and the dangers associated with them, new regulations are being drafted. The environmental impact statement and regulatory analysis were completed in February 1979 and an NPRM on these regulations is anticipated in early 1980.

LICENSING OF PILOTS
CGD 77-084

This regulation takes into account the problems caused by increased ship size and unusual maneuvering characteristics. The proposal would require recency of service for each route upon which a pilot is authorized to serve, licensing with tonnage limitations commensurate with pilot experience, and consideration of ship-handling simulator training for pilots of very large vessels. A regulatory analysis and work plan were completed in October 1978. An NPRM is expected in April 1980.

REVISION OF 46 CFR 157.20-5 DIVISION INTO THREE WATCH REGULATION
CGD 78-037

This revision would require an adjustment in vessel manning requirements, to bring them in line with current legislation. It would change the requirements which

Continued on next page.....

identify personnel who must be used on the three watches and personnel who may be employed in a day working status. An NPRM formerly scheduled to be published on this docket in January 1980 will not be published, as the docket is being withdrawn.

TANK VESSEL OPERATIONS REGULATIONS, PUGET SOUND CGD 78-041

This regulation governs the operation of tank vessels in the Puget Sound area. It was initiated to reduce the possibility of environmental harm resulting from oil spills in Puget Sound. This is to be accomplished by governing the operation of tankers and reducing the risk of collision or grounding.

Former Secretary of Transportation Brock Adams signed a 180-day Interim Rule on March 14, 1978 prohibiting entry of oil tankers in excess of 125,000 deadweight tons in Puget Sound; this appeared in the Federal Register of March 23, 1978 (43 FR 12257). An ANPRM was published March 27, 1978 (43 FR 12840). An extension of the interim rule was published in the Federal Register in order to allow the Coast Guard adequate time to complete this rulemaking.

The public hearings scheduled June 11 and 12 in Seattle, Washington, June 13 in Mt. Vernon, Washington, and June 14 in Port Angeles, Washington have been completed and all the comments received have been entered in the docket files for consideration. The extension of the interim navigation rule was published June 21, 1979 (44 FR 36174). This extension was effective July 1 and will be in effect until the Coast Guard prints notice of its cancellation. Copies of documents or the transcripts of the hearings may be obtained by writing to the Marine Safety Council. A final rule on the docket is currently expected in July 1980.

EIGHT-HOUR DAY VOLUNTARY OVERTIME CGD 78-146

This docket is a review of the Eight Hour Day, Voluntary Overtime regulation in 46 CFR 157.20-10, which states that no licensed officer should be required to be on duty more than eight hours per day except in extraordinary circumstances. Existing regulations, however, do not address overtime or consider any possible "fatigue factor." Recent Coast Guard studies have shown that this factor has a profound effect on reaction time and judgement, therefore the regulation is currently being reviewed and is in the process of being withdrawn.

PERSONNEL JOB SAFETY REQUIREMENTS FOR FIXED INSTALLATIONS ON THE OUTER CONTINENTAL SHELF CGD 79-077

This regulation is concerned with the health and safety requirements for installations and vessels engaged in oil field exploration and development. This action was mandated by pending Outer Continental Shelf legislation. It will provide more comprehensive protection for personnel employed in vessels and installations in the oil trade. The work plan received by the Marine Safety Council (MSC) in early July calls for an NPRM in January 1980.

SHIPBOARD NOISE ABATEMENT STANDARDS CGD 79-134

These standards will establish acceptable sound levels for each of the various vessel compartments based on the latest technology. The standards will differentiate acceptable sound levels for both existing vessels and new vessels, acceptable methods of compliance, and will establish a hearing conservation program.

During the development of these standards, the U.S. Naval Ocean Systems Center (NOSC), San Diego, California was contracted by the Coast Guard to evaluate sound levels aboard several U.S. merchant vessels, to study the data obtained, and then to define the extent of the noise problem. Based on this data and other information available, they were asked to recommend a set of noise levels to be used in the control and/or elimination of the shipboard noise problem for the proposed standards.

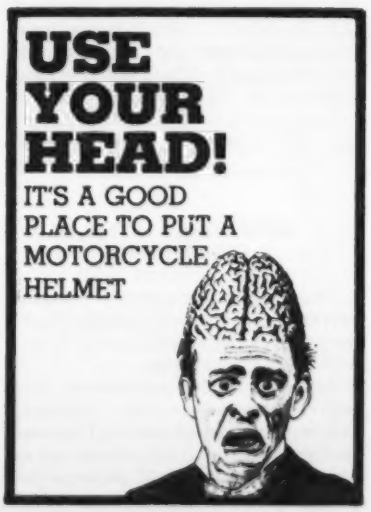
This study has been completed. Copies are available through the National Technical Information Service (NTIS), Springfield, Virginia 22161; request NOSC technical documents numbers 243, 254, 257, 267 and 405.

PERSONNEL AND MANNING STANDARDS FOR FOREIGN VESSELS CGD 79-081

This regulation, deemed necessary to reduce the probability of oil spills, would establish minimum manning levels for foreign tank vessels operating in U.S. navigable waters. It would also establish procedures for the verification of training, qualification and watchkeeping standards. As we go to press, an NPRM is pending.

A complete listing of all Coast Guard regulations, both "significant" and "non-significant," appeared in the Monday, August 27, 1979 Federal Register (44 FR 50140).

THE COAST GUARD HAS NO PUBLIC HEARINGS SCHEDULED AT THIS TIME FOR FEBRUARY OR MARCH



Williamson Turn Tests on the *EL PASO ARZEW*

The following letter was forwarded from Captain James Stilwell, Master of the EL PASO ARZEW. After reading Captain Oliver F. Williams' "Which Williamson Turn?" in the July 1979 U.S. Naval Institute Proceedings, *Captain Stilwell and others aboard his ship conducted some tests of their own. Their findings are worth sharing . . . .*

In response to the letter by Captain Oliver F. Williams, "Which Williamson Turn?" in the July 1979 *Proceedings* I would like to offer the following comments.

After reading said article a discussion was conducted among the officers of the EL PASO ARZEW. Each had his own particular ideas about how the Williamson Turn should be conducted. To satisfy the ambiguities it was decided to conduct two turns. One was to use the Navy method and the other was to use the Coast Guard method as described in CG-175. The object was to determine which method was the more accurate to return the vessel down the original track line.

The turns were conducted on the afternoon of 28 July 1979 aboard the EL PASO ARZEW while enroute from Savannah, Georgia to Arzew, Algeria. Weather conditions were perfect. The sea was glassy, with little or no swell. An empty 55-gallon drum was used in lieu of the traditional "oscar." The EL PASO ARZEW is a 125,000 cubic meter LNG carrier having an LOA of 948'-06", a beam of 135' and a depth of 90'. The drafts during the tests were 29'-00" forward and 34'-00" aft. The height of the eye of the bridge is 121' so no problem was experienced in keeping the drum in sight continuously throughout the test.

It was decided to conduct the Navy method test first. The drum was thrown over the side from the starboard bow. As it became visible from the bridge wing the order was given for "Hard Right Rudder." Thirty-five degrees was used throughout the test for hard rudder although this vessel has capability to forty-five degrees. Hard rudder was held until the vessel was exactly 60 degrees off the original course at which time the rudder was shifted to hard left. The vessel continued to swing to the right until it reached a maximum of 88 degrees off the original course. Hard left rudder was held until the vessel was 25 degrees off the reciprocal course at which time hard right rudder was again applied in order to steady the vessel onto the reciprocal course. Experience has shown that when the vessel is swinging at the maximum rate of turn, 25 degrees lead is required in order not to overshoot the desired course. The vessel steadied on the reciprocal course and the drum passed approximately 100 feet down the starboard side. As shown in the diagrams this method resulted in the vessel being approximately 285 feet to the right of the original course.

The Coast Guard method test began when the drum passed down the starboard side. The order was again given for "Hard Right Rudder." This time the rudder was only held until we were 35 degrees off the original course in order to allow the vessel to steady on a course which was 60 degrees off the original. Hard left rudder was used to accomplish this. When the vessel was steady and 60 degrees off the original course the order was given for "Hard Left Rudder." Once again, when 25 degrees short of the original course hard right rudder was applied to check the vessel's swing and allow her to steady onto the reciprocal course. This time the drum passed about 200 feet down the port side of the vessel. As shown in the diagrams this method resulted in the vessel being approximately 100 feet to the left of the original track line.

Based on the foregoing test I can only conclude that the Coast Guard method is the more accurate method however it has to take into account the maneuvering characteristics of the vessels concerned.

Continued on next page.....

EL PASO ARZEW.....

The Navy method does not result in this vessel returning down the original track line.
Sincerely,

(Signed)

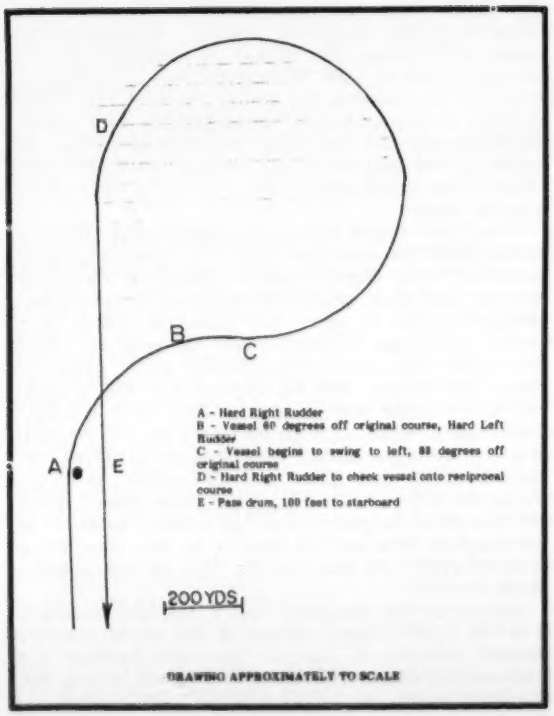
James Stilwell
Master, EL PASO ARZEW

Another reminder that you must always take into account the capabilities and limitations of your particular vessel!

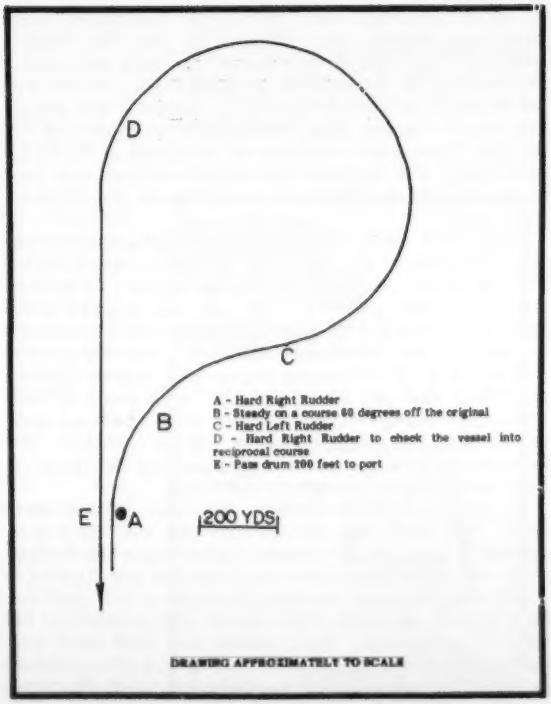
WILLIAMSON TURN (Navy Method). The rudder is put hard over to the side on which person fell over. It is held hard over until vessel is 60 degrees off original course, at which time it is put hard over the other direction. The vessel is then steadied on a reciprocal course to the original.

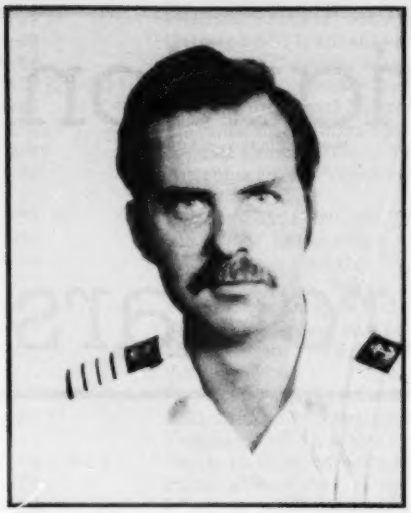
WILLIAMSON TURN (Coast Guard Method) - The rudder is put hard over to the side on which person fell over. The vessel is steadied on a course approximately 60 degrees off the original, at which time the rudder is put hard over in the opposite direction. The vessel is then steadied on a reciprocal course to the original.

NAVY METHOD


D
B
C
A
E
A - Hard Right Rudder
B - Vessel 60 degrees off original course, Hard Left Rudder
C - Vessel begins to swing to left, 88 degrees off original course
D - Hard Right Rudder to check vessel onto reciprocal course
E - Pass drum, 100 feet to starboard
200 YDS
DRAWING APPROXIMATELY TO SCALE

COAST GUARD METHOD


D
C
B
A - Hard Right Rudder
B - Steady on a course 60 degrees off the original
C - Hard Left Rudder
D - Hard Right Rudder to check the vessel into reciprocal course
E - Pass drum 200 feet to port
E
A
200 YDS
DRAWING APPROXIMATELY TO SCALE



About the Author

James Stilwell
Master, EL PASO ARZEW

Captain James Stilwell was appointed Master of the EL PASO ARZEW, a 125,000 M^3 LNG carrier, in June 1978. A graduate of the California Maritime Academy, he has gained experience aboard freighters, drilling vessels, research vessels and tankers. His first command was in December 1973 as master of the T. T. BROOKLYN, then the largest ship to fly the American flag. Since then he has sailed exclusively as master on vessels varying from 20,000 DWT to 226,000 DWT, tankers, OBOS, and LNG carriers. In addition, Captain Stilwell is an active member of the Naval Reserve and holds the rank of Lieutant USNR-R.

Throughout the test maximum rudder (hard) was held to 35 degrees.
"Steady" is defined as Zero Rate of Turn as determined by Rate of Turn Indicator.

Base Course 079 degrees p.g.c., Speed 18.OK
ELAPSED TIME - Each Method, approximately 11m-32s

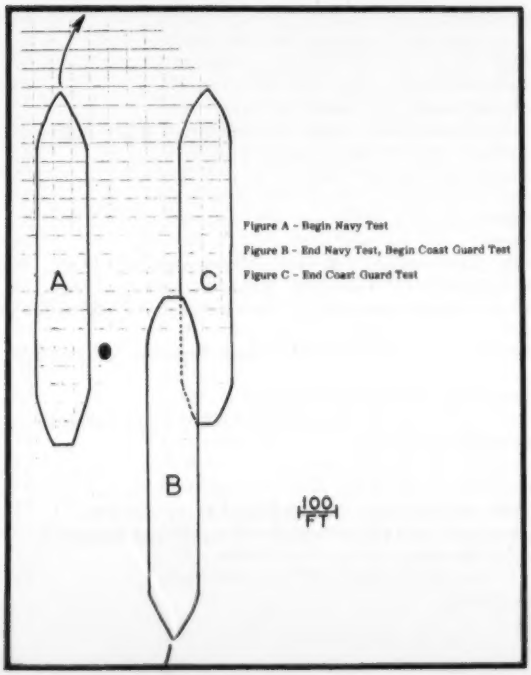
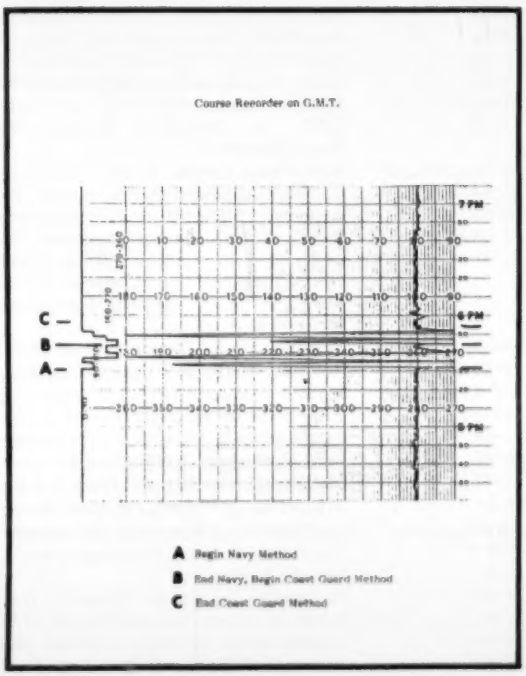


Figure A - Begin Navy Test
Figure B - End Navy Test, Begin Coast Guard Test
Figure C - End Coast Guard Test



Effective Navigation and Inspection Circulars

The effective Navigation and Vessel Inspection Circulars listed below are available individually or by subscription, free of charge, from: Commandant (G-MP-4/14), U.S. Coast Guard Headquarters, Washington, DC 20593, or call (202) 426-2163.

7-56	Manned LST's; Structural Reinforcement and Drydocking; Hull Inspection Requirements
10-60	Placards, Forms, and Instructions Required to be Posted Aboard Vessels; Alternate Materials and Methods
11-61	Fire Hose
12-61	Inspection Procedures for Approved Inflatable Life Rafts Held in Storage
2-62	Watertight Bulkheads in All Inspected Vessels - Maintenance of Watertight Integrity
4-62	Renewal of Deck Officers' Licenses--Great Lakes
5-62	Renewal of Deck Officers' Licenses--Western Rivers
9-62	Liquefied Compressed Gas Cargo Hose
1-63	Notes on Inspection and Repair of Wooden Hulls
2-63	Guide for Inspection and Repair of Lifesaving Equipment
10-63	Typical Class A-60, A-30, A-15 and A-0 Steel Bulkheads and Decks
11-63	LST's as Unmanned Barges; Structural Reinforcement and Drydocking; Hull Inspection Requirements
5-64 CH-1, 2*	Renewal of Ocean Operators' and Operators' Licenses
7-64	Renewal of Operators' Licenses - Great Lakes
8-64	Renewal of Operators' Licenses - Western Rivers
8-64A	Renewal of Operators' Licenses - Western Rivers
1-65	24.0' x 8.0' x 3.58' Steel Lifeboats with Removable Interiors, Oar-propelled (App. No. 160.035/398/0), Hand-propelled (App. No. 160.035/411/0), and Motor-propelled (App. No. 160.035/412/0), manufactured by Welin Davit & Boat, Perth Amboy, New Jersey, Replacement of Short Breast Plates
5-65	Pyrotechnic Red Flare or Star Distress Signals for Pleasure Craft and Other Uninspected Vessels
7-65 CH-1*	Renewal of Deck Officers' Licenses
10-65	Stability Determination in Capsizing Cases Involving Uninspected Vessels
12-65	Alteration or Modification of Existing Cargo or Tank Vessels; Associated Safety Improvements
1-66	Requirements for Hull Structural Steel - Structural Continuity
3-66	Dual Tonnages; Application of
1-67	Stability Test - Preparations and Procedures
3-67	Alteration of Ship's Structure Which May Affect the Adequacy of Installed Safety Devices
4-67	Application of Incombustible Insulation Requirements and Identification of Approved Materials
8-67	Fixed Mud Ballast; Procedures and Standards for its use
3-68	Tensile Fasteners
4-68	Protective Equipment Required for Firemen's Outfits
7-68	Notes on Inspection and Repair of Steel Hulls
8-68	Classification of Vessels as Self-propelled
1-69	Automated Main and Auxiliary Machinery
2-69	Submission of Reports for the Shipment and Discharge of Seamen Not Shipped or Discharged Before a Shipping Commissioner; information concerning

3-69	Z Nomograph Method of Calculating Available GM
4-69	Inclusion of Social Security Numbers on Certificates of Discharge and Discharges for Masters
5-69	Carriage of Flammable and Combustible Liquids in Portable Tanks
6-69	Hazardous Cargoes; Literature Concerning
7-69 CH-1,2*	Hydraulic Releases with Primary Lifesaving Equipment and Alternate Float-Free Arrangements
8-69	Impulse-Projected Rocket Type Line-Throwing Appliances
11-69	Statement of Claims for Specially Exempted Water-ballast Spaces in Tonnage Calculations
12-69	Special Examination in Lieu of Drydocking for Large Mobile Drilling Units
2-70	Acceptance of Pressure Vessels used as Decompression Chambers or for Other Purposes Related to Diving
4-70	Powder Loads for Lyle Type Line Throwing Guns
6-70	Fixed Fire Extinuishing Systems for Use in Galley Ventilating Equipment
7-70	Marine Type Portable Fire Extinguishers
1-71	Repair of Boiler Safety Valves
2-71	Pipe Stress Analysis Calculations; Procedure for Submission of
4-71	Valves Employing Resilient Material
5-71	Index to 46 CFR Part 151 (Certain Bulk Dangerous Cargoes on Unmanned Tank Barges), Subchapter 0
6-71	Monitoring Carbon Monoxide (CO) in Ship's Cargo Spaces
3-72	Portable Radio Apparatus, training in use of
4-72	Definition of Paraffinic Hydrocarbon Commodities
6-72 CH-1*	Guide to Fixed Fire-Fighting Equipment Aboard Merchant Vessels
1-73	Pilot Ladders used aboard Merchant Vessels
3-73	Intact Stability Criteria for Passenger and Cargo Ships under 100 Meters in Length
4-73	American Bureau of Shipping Approval of Machinery and Electrical Plans
6-73	Interim Regulations for Foreign Vessels Carrying Certain Bulk Dangerous Cargoes in U.S. Ports
7-73	Main Propulsion Boiler Automation
8-73	Alternate Means of Determining the Weight of CO_2 in Fire Extinguishing Systems
9-73 CH-1*	Implementation of the Pollution Prevention Regulations (33 CFR, Subchapter 0 and Amendments to 46 CFR, Subchapter D)
2-74	Change in Administration of Ships' Stores and Supplies of a Dangerous Nature
3-74	Implementation of the Regulations Concerning Licenses for Operation of Uninspected Towing Vessels (46 CFR, Subpart 10.16 and Sections 157.10-83, 157.10-85, 157.30-45)
4-74	Stability Information Required on Inspected and Uninspected U.S. Vessels Receiving a Load Line Certificate and Foreign Vessels Receiving Form B Load Line Certificates
6-74	Elimination of Unsafe Conditions on Board Tank Barges
7-74	Oil-water Separators; acceptance of
1-75	Fire Safety Standards for Foreign Passenger Vessels
2-75	Alteration of Existing Rafts to Comply with Improved Inflation Standards
3-75	Bulk Grain Cargoes
4-75	Bulk Liquid Cargoes; Guide to Compatability of Chemicals
2-76	Damage Stability Calculations for Tank Vessels
3-76	Stability of Fishing Vessels
1-77	Unified Interpretations of the 1966 International Convention on Load Lines
2-77	American Bureau of Shipping Acceptance of Structural Fire Protection Approval
3-77	Code of Safe Practice for Ships Carrying Timber Deck Cargoes
4-77	Shifting Weights or Counter Flooding During Emergency Situations
5-77	Inspection of Hydraulic Starting Systems for Lifeboats and Survival Capsules
1-78 CH-1*	Automation of Offshore Supply Vessels of 100 Gross Tons or Over
2-78	Bulk Grain Cargo Regulations (46 CFR 31.10-33, 46 CFR 74.10-12, and 46 CFR 93.20)
3-78	Cross-Reference List Between the IMCO Chemical Code and 46 CFR, Part 153
4-78	Inspection and Certification of Existing Mobile Offshore Drilling Units
1-79	Literature Concerning Hazardous Cargoes
2-79	Aluminum Bus Bars
3-79	Lifeboat Capacity on Foreign Flag Passenger Vessels
4-79	Recommended Procedures for Using Smith & Wesson International Line Throwing Appliances
5-79	Inerting and Tank Cleaning Procedures for Alkylene Oxide Containment Systems
6-79	Coast Guard Review of Merchant Vessel Plans and Specifications
7-79	1969 Amendment to the International Convention for the Prevention of Pollution of the Sea by Oil 1954; operational compliance with
8-79	Shipment and Discharge of Seamen

*Please note change

Fumigation of Ships' Holds, Unmanned Barges and Freight Containers

By John F. McAnulty
Cargo and Hazardous Materials Division
U.S. Coast Guard Headquarters, Washington, DC

Hundreds of millions of tons of grain have been exported each year from this country to ports world wide--principally to Russia, China and Japan. This year about 40 million tons of wheat, corn and soybeans will be funneled from thousands of midwest farms into terminals along the Mississippi, Illinois, Ohio, Missouri and Arkansas Rivers. This vast river system, extending from Minneapolis to New Orleans and running through the richest agricultural basin in the world, has become the main thoroughfare of the American grain trade.

INFESTATION AND FUMIGATION

Grain is subject to a variety of insect and rodent infestations from the field and from handling, storage and shipping facilities. When continuously cooled (52 degrees F. or less) and properly aerated it may be stored for prolonged periods of time practically infestation free. However, during its journey to the final shipping destination it becomes contaminated and requires a chemical treatment to destroy the insects.

The chemical agents used for deinfestation may be added to the grain in the form of sprays, fogs or gases or by direct contact. Fumigants discussed in this article are liquid or solid compounds that release poisonous gases. Unfortunately, these gases are harmful, possibly fatal, to humans as long as they remain potent. Therefore, they constitute a safety hazard from the time of application throughout the duration of their potency—which may last for several days.

One widely used preparation, an aluminum phosphide compound sold commercially as "Detia" or "Phostoxin," reacts with moisture to produce phosphine (PH_3), carbon dioxide and ammonia. Phosphine is more toxic to insects than either cyanide or methyl bromide, all of which are highly toxic to humans. It is used in the marine mode because it is coated with paraffin, which temporarily inhibits the release of the fumigant. This is important when phosphine is applied

The opinions or assertions contained herein are the private ones of the author and are not to be construed as official or reflecting the views of the Commandant or the Coast Guard at large.

in confined spaces because it allows the fumigator to leave the area before a lethal atmosphere has time to accumulate. The release of gases will continue two or three days; in an airtight compartment, the fumigating effect of phosphine may continue for a number of days.

Grain insects pass through four stages--egg, larva, pupa, and adult. Growth takes place in the larval stage. In the final stage insects form a hard shell which limits growth and prevents effective fumigation. Thus, fumigation is never complete. Once the potency of the poisonous gas is lost, the chain of insect growth begins anew. The insects cause deterioration in the grain by spontaneous heating due to biological action, and they cause weight shrinkage by actually consuming the kernels.

BACKGROUND OF CURRENT FUMIGATION REGULATIONS

Fumigating ships' cargo holds and cargo spaces presents problems not normally encountered in other types of fumigation. The large amount of gas required and the fact that space configurations vary from ship to ship and hold to hold make it imperative that qualified pest control operators perform ship fumigation. In some instances, ships sail from port with their holds under fumigation.

Initially, the U.S. Coast Guard attempted to govern shipboard fumigation through the ships' stores regulations (46 CFR 147) issued January 18, 1941. These regulations were intended to control the use of all dangerous and hazardous materials on board vessels, including all types of fumigants. Fumigant vendors and manufacturers were required to obtain USCG certification for their products. These certificates were issued once the Coast Guard was satisfied that the product could be used safely in accordance with the instructions on the label.

The International Maritime Consultative Organization (IMCO) was also concerned with the safe use of fumigants. Under the direction of IMCO's Maritime Safety Committee, the Subcommittee on the Carriage of Dangerous Goods prepared "Recommendations on Pesticides in Ships," which were issued as MSC/108 on September 30, 1971. These recommendations were intended as a guide to mariners as well as other competent authorities. They were general in nature and included all types of infestation removal. However, they were not keyed to shipboard fumigation of grain, did not contain detailed safety precautions, and were too broad for specific application.

DEVELOPMENT OF CURRENT FUMIGATION REGULATIONS

In the early 1970's, there were numerous shipboard casualties involving fumigation which demonstrated the importance of establishing specific fumigation regulations. In spite of attempts to insure proper use of fumigants, the continuing incidents indicated that many fumigant vendors and manufacturers were not complying with the regulations. One incident that brought unfavorable publicity to ship fumigation practices occurred on October 9, 1973. Two grain samplers at a New Orleans dock entered a previously fumigated ship hold and were fatally overcome by lingering fumes. Six other persons were injured by fumigant inhalation as they tried to rescue their fellow workers.

As a result of these incidents, in 1973-74 the Coast Guard held a series of meetings with the Departments of Labor and Agriculture and the Environmental Protection Agency (EPA) in order to produce effective nonoverlapping regulations which would provide safeguards. Regulations were developed both by the Coast Guard and the Department of Labor with assistance from the Department of Agriculture and EPA. The meetings focused attention on several unsafe practices which the proposed regulations would have to address. These included:

A. Entering fumigated spaces before ventilation was complete;

B. Entering fumigated spaces without testing the atmosphere for fumigant vapor or oxygen content;

C. Fumigating and ventilating spaces without having respiratory protective equipment on board;

D. Fumigating holds and allowing the vessel to sail with no testing equipment on board or without the crew having detailed knowledge of the fumigant that was used in the hold;

E. Fumigating containers and shipping them with no visible warning that they may contain poisonous materials;

F. Neglecting to isolate fumigated spaces and to check to make certain the fumigant does not leak from the isolated spaces.

In order to correct the problems that were causing shipboard fumigation incidents and to strengthen safety precautions and procedures, the Coast Guard issued the present "Interim Regulations for Shipboard Fumigation" (46 CFR 147A). These were published in the Federal Register on September 13, 1974. They were published as interim regulations in response to the urgent need for shipboard fumigation control, evidenced by the recent rash of connected casualties. It was intended that these regulations would be later issued in final form based on the experience resulting from their application.

The interim regulations defined terms and required the notification of the Captain of the Port for all fumigations. A very important definition is that of the fumigator or "qualified person." A "qualified person" is one who has had experience with the applicable fumigants and detection equipment, or an applicator certified by the EPA for the fumigant used. A person may be qualified by experience or training, but in any case he must know the properties and dangers

Continued on next page.....

of the fumigant and be able to ascertain fumigant concentrations by suitable detection equipment.

These interim regulations established that both the fumigator and the person in charge of the vessel must be designated for each fumigation operation. The fumigator must be designated by the firm doing the fumigation. The person in charge of the vessel must be designated by the ship owner or master. By designating these two individuals, communication between the fumigating crew and the ship's crew is simplified and each has designated duties and responsibilities.

46 CFR 147A also mandated that before fumigation begins the fumigator must inform the vessel's master of the spaces in which occupancy is allowed during fumigation. He must inform all appropriate parties of the symptoms of poisoning and first aid treatment. The fumigator must be familiar with the vessel's construction to ascertain the ability of designated spaces to contain the fumigant. The fumigator must determine the frequency of testing to determine gas leakage. He must also see that proper warning signs (National Fire Prevention Association standards) and watchmen are posted in unsafe areas. The master of the vessel must know what, if any, spaces are safe for occupancy during fumigation. If there are no safe spaces he must see that all persons not involved in fumigation leave the vessel.

During fumigation the fumigator must inspect the vessel for leakage into the occupied areas. These inspections must be carried out at specified time intervals and if there is leakage he must notify the master, who takes the necessary steps to prevent injury. After the completion of fumigation with the vessel at berth the fumigator must oversee the subsequent ventilation to ensure that it is done safely and that the atmosphere in the treated space is tested and determined safe for entry. Once the area is safe the warning signs and watchmen may be removed.

It is the master's responsibility to insure that all persons aboard follow the instructions of the fumigator and that appropriate action be taken if there is dangerous leakage of poison into the occupied areas. If the vessel leaves port while under fumigation the master must be certain that adequate personnel protection equipment and detectors are on board and that periodic inspections are made for fumigant leakage into occupied areas. The master must also make certain that all fumigated spaces are ventilated and tested as safe before entry is allowed.

Upon completion of fumigation, after the spaces are certified as safe for humans, either the master or fumigator must dispose of all fumigant residue and warning signs.

A PHOSPHINE POISONING *EN ROUTE*

In September 1978, the author became involved with an incident which illustrates the problems that may result from disregarding Coast Guard regulations.

This incident occurred aboard a foreign bulk grain vessel. The vessel is a two-house ship (midship and aft) with all the machinery in the aft house. The midship house stands on the main deck with cargo holds Nos. 3 and 4 continuing underneath. With the exception of the navigation bridge on the 03 level and the storage room (including the fresh water tank on the main deck level) the midship house is entirely devoted to living quarters.

The vessel was loaded with grain in Chicago to be shipped to the Far East. Holds Nos. 1, 2, 5 and 6 were loaded and No. 3 hold was half loaded. The Federal Grain Inspection Service found No. 3 hold weevily and had it treated with Phostoxin. The ship then sailed through the St. Lawrence Seaway to Port Cartier, Canada where it was topped off by loading Nos. 4 and 7 holds and adding additional grain to No. 3 hold. All holds were then treated with "Detia," an aluminum phosphide based compound. Shortly after the fumigant was added the ship sailed. The contract not only required that the grain be fumigated in transit but that the fumigant should remain potent during the entire trip. The time estimate for release of phosphine is two to eight days, and by sealing the hatches this time is extended.

By late afternoon of the day the ship sailed, symptoms of poisoning were apparent in several people aboard and the captain signaled the Coast Guard for help. When the vessel was 480 miles southeast of Boston a dramatic air evacuation effort removed the three most serious cases to a Boston hospital. They were the captain's wife and two small children. The youngest child (22 months old) was declared dead on arrival. The vessel then proceeded under *force majeure* to New York, where in late September it was boarded by a team consisting of the Coast Guard, the U.S. Public Health Service, the Department of Agriculture (USDA), the fumigant manufacturers and the vessel flag consul. While some Coast Guard personnel boarded with the medical team, the remainder, along with the USDA, conducted a search to locate the source of poisoning.

The source of poisoning, phosphine, was found in the midships house where the highest concentration was detected in the water tank room. Testing indicated that the gases entered the water tank room through two electrical stuffing boxes in the main deck. It was concluded that the poison gases from No. 3 hold passed through the stuffing boxes to the water tank room and then spread throughout the house by natural convection, in combination with the heating system. The dead child had been quartered in the room directly above the water tank storeroom and all persons affected lived, worked or had access to the midship deck house for extended periods. The survey also indicated that the phosphine level in the holds was not high enough to effect complete insect control because the holds were not gas tight.

The experience of this vessel indicated that several safety precautions proposed in the regulations were not followed. For example:

A. The ship's living quarters were directly over the hold, allowing phosphine to escape into the accommodations;

B. There was no indication of either a written transmission to the captain of the dangers of

Continued on next page.....

the fumigant, or that he understood the nature of phosphine poisoning;

C. There was no evidence of fumigation information being transmitted to the crew. It was noted that since the crew had no common language it was possible to transmit the instructions clearly only if several languages were used;

D. There were no fumigation detection or self-contained breathing apparatus on board;

E. There were no tests made to determine possible toxic vapor leakage into the living quarters.

CURRENT DEVELOPMENTS

After the interim regulations (46 CFR 147A) were issued as a final rule, it became obvious that they did not cover unmanned barges or freight containers. To rectify this situation the Coast Guard issued special permits 2-75 for unmanned barges and 52-75 for freight containers.

Current (interim) regulations are now under revision and will be issued shortly as a Notice of Proposed Rulemaking. The revised regulations will correct deficiencies in the current regulations by including provisions for freight containers and unmanned barges. Special permits for alternate procedures will be permitted, provided that the applicant for the special permit recommends a method

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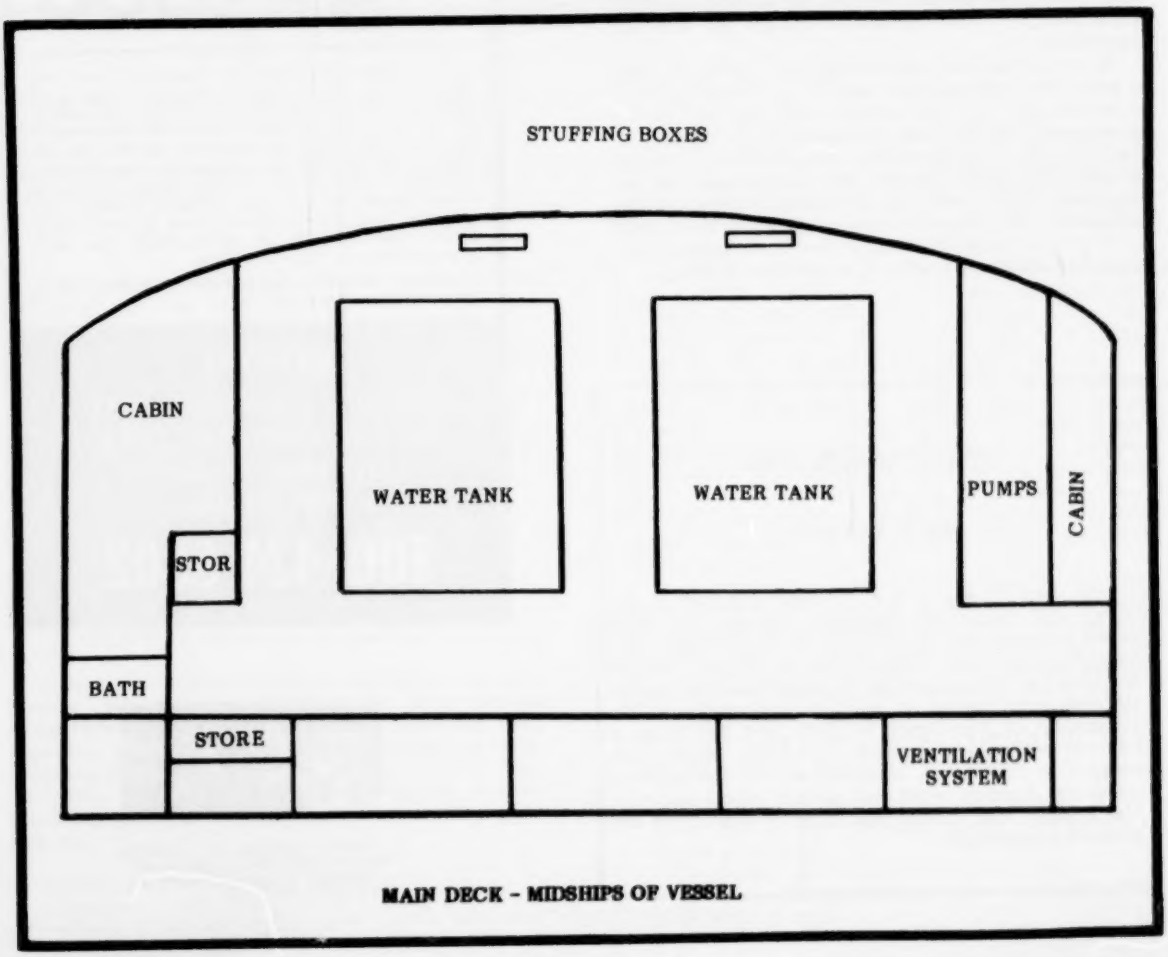

MAIN DECK - MIDSHIPS OF VESSEL

of fumigation that is as safe as that procedure permitted by the regulations. The proposed regulation defines a fumigator as a fumigation applicator certified by the EPA or a state agency designated under 40 CFR. All fumigants for shipboard use will require EPA approved labels on their containers in accordance with 40 CFR 162, which defines a fumigant as a substance or mixture of substances that is in or is progressively transformed into a gaseous state.

The IMCO recommendations are being revised to include provisions for (a) a 24-hour delay of the ship's departure after fumigation to check for gas leakage or (b) a 72-hour monitoring period by the fumigator (or his designate) after the ship departs to check for fumigant leakage. It also recommends that intransit fumigation should be limited to tankers or bulk carriers.

CONCLUSIONS

Unfortunately, fumigation-related incidents continue to occur. Within the last few months, another death resulted from failure to follow the existing regulations.

In any action involving fumigation it must be kept in mind that fumigants are harmful and possibly fatal to humans and must be handled, monitored and tested by personnel who know all the hazardous properties of the fumigant. They must know the methods of testing for harmful concentrations and the proper use of personnel safety equipment for safe handling of the fumigants. No fumigated area should be entered until a determination is made by a qualified person, with proper detection equipment, that the area is safe.

About the Author

John F. McAnulty

Mr. John McAnulty is a chemical engineer in the Cargo and Hazardous Materials Division at Coast Guard Headquarters. In this field he is concerned with hazardous materials when shipped as dry bulk cargoes and with the storage and use of hazardous ships stores. He earned his degree in chemical engineering at the University of Pittsburgh in 1935 and has been a licensed professional engineer since 1949. He has been engaged in the design, construction and operation of chemical, petrochemical and nuclear plants and with risk analysis and quality assurance of explosives and military ammunition.

DEPT. OF TRANSP., USCG, CG-5070 (REV. 1-76)

THIS STICKER CAN SAVE YOU

$10,000

ANY PERSON IN CHARGE OF A VESSEL OR OF AN ONSHORE OR AN OFFSHORE FACILITY SHALL, AS SOON AS HE HAS KNOWLEDGE OF ANY DISCHARGE OF OIL OR A HAZARDOUS SUBSTANCE FROM SUCH VESSEL OR FACILITY, IMMEDIATELY NOTIFY THE APPROPRIATE AGENCY OF THE UNITED STATES GOVERNMENT. ANY SUCH PERSON WHO FAILS TO NOTIFY IMMEDIATELY SUCH AGENCY OF SUCH DISCHARGE SHALL, UPON CONVICTION, BE FINED NOT MORE THAN $10,000 OR IMPRISONED FOR NOT MORE THAN ONE YEAR, OR BOTH.

*FEDERAL WATER POLLUTION CONTROL ACT, SECTION 311(b)(5).

REPORT
OIL OR CHEMICAL SPILL
TO THE COAST GUARD
TOLL FREE NUMBER
ANYTIME
800-424-8802

Officer, pointing to cigarette butt on deck: "Son, is that yours?"
Seaman: "That's all right, sir. You saw it first."

• • •

Lessons from Casualties

Like the "stitch in time" philosophy, preventive maintenance certainly pays off in the long run! In fact, neglect of routine maintenance or haphazard repairs can be downright dangerous, as illustrated in the two episodes below.

* * *

A 33-ioot passenger vessel experienced an engine failure at sea due to overheating. The cause was determined to be an accumulation of small bits of clear plastic (the type used for food wrapping) in the main engine sea suction valve. The reduced cooling water flow resulted in excessive engine temperatures.

There seems to have been a rash of these incidents lately, all resulting from engine sea suction lines becoming clogged with debris. These casualties should serve as a reminder that it is always important to watch your temperature gage(s). If a malfunction is indicated,

--Secure the engine before it seizes;
--Check the strainer on the intake (is there a strainer?);
--Backflush the cooling line if possible.

In addition, a large number of failures at sea have recently been reported involving sea water pumps. Pump failure may result from normal wear and tear; impellers, seals, bearings and even the bodies may fail. Likewise, it is common for the belt (or belts) driving the pump to wear out. A little preventive maintenance can spare you time and trouble later. It's a good idea to:

--Check the cooling pump regularly;
--Replace a worn pump;
--Check drive belts regularly;
--Carry spare belts.

* * *

During a routine "abandon rig drill" in the Gulf of Mexico, the wire hoisting line raising a 24-man survival capsule failed at the socket. The capsule, being docked at the time, plummeted 70 feet into the ocean. Ten of the eleven crewmen on board suffered serious injuries, mostly to their backs and spines.

Some time previous to the casualty, the rig crew noted that the capsule's retrieving wire was corroded and that the rope socket was damaged. The rig supervisor directed on board repairs despite the fact that no one felt qualified to make suitable repairs.

The repairs were subsequently made; however, no weight test was conducted. When a representative of the company which manufactured the capsule and attendant docking structure came aboard for a routine examination of the repairs, he noted an electrical failure of the limit switches, which prevent "two-blocking" the capsule against the launch and hold frame. New ones were delivered but not installed prior to the casualty.

A post-casualty examination revealed that the manufacturer's recommended repair procedures were not followed. For instance, the babbit material was lead base versus the recommended molten zinc. The wire was not seized to prevent unraveling and was not cleaned with a degreaser and muriatic acid solution.

Where lifesaving equipment is concerned, the practice of good seamanship is not restricted to ships. From this casualty we are all reminded:

--To utilize knowledgeable repair sources;
--To follow the manufacturer's recommended repair guidelines;
--To conduct post-repair dummy load tests;
--To insure that all related safety devices are in good working order.

1980 INTERNATIONAL ICE PATROL SERVICE

In February or March 1980, depending upon iceberg conditions, the International Ice Patrol will commence its annual service of guarding the southeastern, southern and southwestern limits of the regions of icebergs in the vicinity of the Grand Banks of Newfoundland. Reports of ice in this area will originate from passing ships and from flights by Ice Patrol aircraft. Ice Patrol will broadcast a bulletin twice each day, containing ice information to inform ships of the extent of this dangerous region. Broadcasts of the Ice Patrol Bulletin will be made as indicated below:

BROADCAST STATION	TIME OF BROADCASTS (GMT)	FREQUENCIES (kHz)
SITOR ICE BROADCAST		
Coast Guard Communication Station Boston/NIK	0018 1218	5340, 8502 8502, 12750
CW BROADCASTS		
Coast Guard Communication Station Boston/NIK (Best to follow SITOR best)	0030 (APPROX) 1230 (APPROX)	5302, 8502 8502, 12750
Canadian Forces Station Mill Cove/CFH	0130, 1330	438 (Off-air 1200-1600 second Thurs. each month) 4255 (2200-1000) 6430 Continuous 8697 Continuous 12726 (1000-2200) 16926.5 On request 22397.5 On request
Navy LCMP Broadcast Norfolk, VA/NAM	0030-0115 0630-0715 1000-1100 1230-1300 1900-1945 2300-2359	8090 Continuous 12135 Continuous 16180 Continuous 20225 (1200-2359)
Thurso, Scotland	same times	7504.5 Continuous 12691 (0800-1900) 3724 (1900-0800)
Keflavik, Iceland	same times	5167 (1900-0800)

BROADCAST STATION	TIME OF BROADCASTS (GMT)	FREQUENCIES (kHz)
RADIOFACSIMILE BROADCASTS		
Coast Guard Communications Station Boston	1600	8502, 12750 (+400 Hz)
Canadian Forces Station Mill Cove/CFH (Primarily sea ice in Gulf of St. Lawrence and North. Limits of icebergs sometimes given)	0000, 1300, 2200	133.15 Continuous (Off air 1200-1600 second Thursday each month) 4271 (2200-1000) 6330 Continuous 9890 Continuous 123510 (1000-2200)
Radio Station Bracknell, United Kingdom/GFE (Eastern North Atlantic Sea Ice Observations)	1413	2618.5 (1800-0600 Oct 1-Mar 31 1900-0500 Apr 1-Sep 30) 4782 Continuous 9203 Continuous 14436 Continuous 18261 (0600-1800 Oct 1-Mar 31; 0500-1900 Apr 1-Sep 30)
SPECIAL BROADCASTS		
Canadian CG Radio Station St. John's/VON	As required when icebergs are sighted outside the limits of ice between regularly scheduled broadcasts	478 Preceded by International Safety Signal (TTT) on 500 kHz.
International Ice Patrol Vessel	When in the vicinity of ice in periods of darkness or fog. Format located in Appendix 1 to Annex A	2670 Preceded by International Safety Signal (SECURITE) on 2182 kHz.

REPORTS OF ICE, SEA SURFACE TEMPERATURES, AND WEATHER

All shipping may assist in the operation of International Ice Patrol by reporting all sightings of ice at once to COMINTICEPAT NEW YORK NY via the radio stations listed in the following section. When reporting ice, please include the following information:

POSITION
SIZE AND SHAPE OF ICEBERG
CONCENTRATION OF ICE (FOR SEA ICE IN TENTHS)
THICKNESS OF ICE (FOR SEA ICE, SPECIFY IN FEET OR METERS)

The following tables describe icebergs reported to the Ice Patrol:

DESCRIPTIVE NAME	HEIGHT (feet)	(meters)	LENGTH (feet)	(meters)
Growler	(G) less than 4	less than 1	less than 20	less than 6
Small Iceberg	(S) 4 - 50	1 - 15	20 - 200	6 - 60
Medium Iceberg	(M) 51 - 150	16 - 45	201 - 400	61 - 122
Large Iceberg	(L) more than 150	more than 45	more than 400	more than 122

	TYPE
SHAPE	DESCRIPTION
Blocky	(B) Steep sides with flat top. Very solid. Length-height ratio less than 5:1.
Tilted Blocky	(V) Blocky iceberg which has tilted to present a triangular shape from the side.
Drydock or near waterline.	(K) Eroded such that a large U-shaped slot is formed with twin columns. Slot extends into
Pinnacled	(P) Large central spire or pyramid.
Dome	(D) Large round smooth top. Solid type iceberg.
Tabular	(T) Flat topped iceberg with length-height ratio greater than 5:1

In addition to ice reports, sea surface temperature and weather reports are important to the Ice patrol in predicting the drift and deterioration of ice and in planning aerial patrols. Please make these reports to the Ice Patrol every 6 hours when within latitudes 40N to 50N and longitudes 42W to 60W. Ships with one radio operator may prepare the reports every 6 hours and hold them for transmission when the radio operator is on watch. When reporting, please include the following:

SHIP POSITION, COURSE, SPEED, VISIBILITY, AIR AND SEA SURFACE TEMPERATURE, WIND DIRECTION AND SPEED

It is not necessary to make the above weather report if the ship is making routine weather reports to METEO WASHINGTON.

COMMUNICATIONS WITH COMMANDER, INTERNATIONAL ICE PATROL (COMINTICEPAT)

Report ice sightings, weather, and sea surface temperature to COMINTICEPAT NEW YORK NY through U.S. Coast Guard Communication Stations, or, if unable to work these stations, Canadian Coast Guard Radio Station St. John's/VON. Make these reports in accordance with the following chart. Note that direct printing radio teletype (SITOR) is available through USCG Communications Station Boston (NMF, NIK).

CALL	LOCATION	BANDS GUARDED DAY	NIGHT	WORKING FREQUENCY
NMF NIK	USCG Communications Station, Boston, MA	500 kHz	500 kHz	427/472 kHz
		CALLING FREQUENCIES (Channel 4-5-6)		
		8 MHz	8 MHz	8459.0 kHz
		12 MHz	12 MHz	12783.0 kHz
		DIRECT PRINTING RADIO-TEPETYPE SELCALL 1.01195 (Assigned frequency shown)		
		4176.0 kHz	4176.0 kHz	4355.5 kHz
		6292.0 kHz	6292.0 kHz	6500.0 kHz
		8349.5 kHz	8349.5 kHz	8710.5 kHz
		12497.0 kHz	12497.0 kHz	13077.0 kHz
		16666.0 kHz	16666.0 kHz	17203.0 kHz
		22198.0 kHz	22198.0 kHz	22567.0 kHz
		SSB VOICE FREQUENCIES (Carrier frequency shown)		
		6200.0 kHz	6200.0 kHz	6506.4 kHz
NMN	USCG Communications Station, Portsmouth, VA	500 kHz	500 kHz	466 kHz

		CALLING FREQUENCIES (Channel 4-5-6)		
		8 MHz	8 MHz	8465.0 kHz
		12 MHz	12 MHz	12718.0 kHz
		16 MHz		16976.0 kHz
		SSB VOICE FREQUENCIES (Carrier frequency shown)		
		1200-0200 GMT	0200-1200 GMT	
			4143.kHz	4428.7 kHz
		200.0 kHz	6200.0 kHz	6506.4 kHz
		241.5 kHz	8241.5 kHz	8765.4 kHz
		12342.4 kHz		13113.2 kHz
VON	Canadian Coast Guard Radio Station, St. John's, NFLD	500 kHz	500 kHz	478 kHz

Vessels equipped with MARISAT may send messages at their own expense to COAST GUARD NYK (TELEX NO. 126831).

Telephone communications are available to the Ice Patrol Office in New York throughout the season. the numbers are:

212-668-7882 (Ice Patrol Duty Officer) or
212-668-7055 (Coast Guard Operations Center, New York)

GULF OF ST. LAWRENCE INFORMATION

The Canadian Ministry of Transport provides sea ice information services for the Gulf of St. Lawrence, as well as the approaches, from 58-00W to 66-30W longitudes including the Strait of Belle Isle to west of Belle Isle, during the approximate period December to late June. Ships may obtain ice information by contacting Ice Operations Officer, Dartmouth, Nova Scotia via any east coast Canadian Coast Guard radio station. Details of the services are available from Ice Operations Office, Marine Services Information Center, Ministry of Transport, P.O. Box 1013, Dartmouth, Nova Scotia. Telephone 902-426-5664 or 5665. TELEX 019-22625.

SUPPLEMENTARY ICE INFORMATION

Obtain supplementary ice conditions and navigational warnings for the Strait of Belle Isle, the coast of Newfoundland, and the Grand Banks by contacting Canadian Coast Guard radio stations, St. Anthony/VCM, Comfort Cove/VOO, St. Lawrence/VCP, or St. John's/VON.

WARNINGS

1. In spite of the best efforts of the Ice Patrol to prevent such occurrence, icebergs have and will drift unnoticed into the usual shipping routes in the area of the Grand Banks. The positions of icebergs in the Ice Bulletin are for 12 hour drift intervals. However, after about 5 days without resighting, the positions estimated by driftings are unreliable. The Ice Bulletin indicates the dates of iceberg sightings.

2. In general, only icebergs south of about 48N appear in the Ice Bulletin. In the event there are large numbers of icebergs south of 48N, the Ice Bulletin will carry the positions of only those icebergs near the limits of ice and isolated icebergs.

3. Careful tests by the Ice Patrol proved that radar cannot provide positive assurance of iceberg detection. Since sea water is a better reflector of radar signals than ice, an iceberg or growler inside the area of sea return on the radar scope may not be detected. The average range of radar detection of a dangerous growler or very small iceberg, if detected at all, is only 4 miles. While radar remains a valuable aid for ice detection, its use cannot replace the traditional caution exercised in the vicinity of the Grand Banks while transiting south of the estimated limits of all known ice.

COMMENTS

Ice Patrol earnestly solicits comments, particularly concerning the effectiveness of the times and frequencies of radio transmissions. Please mail facsimile charts received at sea to Commander, International Ice Patrol, Governors Island, New York, NY 10004. Please indicate the frequency used and position of the ship when it received the broadcast.

Nautical Queries

The following items are examples of questions included in the Third Assistant Engineer through Chief Engineer examinations and the Third Mate through Master examinations.

DECK

(1) The reaction of a Gyro compass to forces or torques applied to the spinning gyro to keep it aligned in a north indicating direction is known as what?

A. Precession
B. Earth rate
C. Gyroscopic inertia
D. Gravity effect

REFERENCE: Dutton, 12th Ed.

(2) What is the basic magnetic principal on which the operation of the magnetic compass is based?

A. Magnetic materials of the same polarity repel each other and those of opposite polarity attract.
B. The earth's magnetic lines of force are parallel to the surface of the earth.
C. Magnetic meridians connect points of equal magnetic variation.
D. The compass needle(s) will, when properly compensated, lie parallel to the Isogonic lines of the earth.

REFERENCE: Dutton, 12th Ed.

(3) When you are using a radar in which your own ship is shown at the center of the screen and 0 degrees always appears at the top of the screen, the bearings can be defined by which of the following?

A. Relative
B. True
C. Compass
D. Magnetic

REFERENCE: Dutton, 12th Ed.

(4) When using OMEGA which of the following is a true statement?

A. A diurnal correction is applied to the readout obtained from the receiver.
B. The readout from the receiver is plotted directly without correction on the OMEGA chart.
C. Due to the long range of OMEGA a sky wave correction must be applied.
D. The lane count must be added to the readout from the receiver before plotting.

REFERENCE: Dutton, 12th Ed.

(5) The current that, in many respects, is similar to the Gulf stream is the

A. Kuroshio.
B. California Current.
C. Oyashio.
D. Benguela Current.

REFERENCE: Bowditch, 1962 Ed.

ENGINEER

(1) Water hammer in steam lines can be prevented by

A. keeping lines drained and insulated.
B. replacing all 90 degree elbows with capped tees.
C. opening the steam supply valve wide to prevent pressure drop.
D. keeping steam temperature below the saturation point.

REFERENCE: Modern Marine Engineer's Manual, Osbourne

(2) Cold weather starting of a diesel engine may be made easier by

A. decreasing the compression ratio.
B. using a special fuel having a high ignition temperature.
C. increasing the starting air supply.
D. heating the jacket water.

REFERENCE: Diesel Engine Operation and Maintenance, Maleev

(3) A short circuit in the armature of a D.C. motor would cause the motor to

A. run fast.
B. hum when energized.
C. spark at the brushes.
D. vibrate.

REFERENCE: Preventive Maintenance of Electrical Equipment, Hubert

(4) Coast Guard regulations require that vents from ballast and fuel tanks shall

A. extend above the weather deck.
B. be equipped with a ball check valve.
C. be closed by means of an automatic hinged closure.
D. not extend more than 30 inches above the weather deck.

REFERENCE: 46 CFR 56.50

(5) Pumps normally used for fuel oil service are

A. two-stage centrifugal pumps.
B. positive displacement rotary pumps.
C. explosion proof gear pumps.
D. nonvented plunger pumps.

REFERENCE: Marine Engineering, Harrington

ANSWERS

Deck
1. A; 2. A; 3. A; 4. A; 5. A

Engineer
1. A; 2. D; 3. C; 4. A; 5. B

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications may be obtained from the nearest marine safety office, marine inspection office or by writing: **Commandant (G-CMA/TP26), U.S. Coast Guard, Washington, DC 20593.** Because changes to the rules and regulations are made from time to time, these publications can be kept current between revisions only by referring to the Federal Register. (Official changes to all Coast Guard authored federal regulations are published as final rules in the Federal Register on Mondays or Thursdays.) Following the title of each publication in the table below are the dates of the most recent editions and changes, if any.

The Federal Register may be obtained by subscription ($5 per month or $50 per year) or by individual copy (75 cents each) from SupDocs, U.S. Government Printing Office, Washington, DC 20402.

CG No.	TITLE OF PUBLICATION
CG-101-1	Specimen Examinations for Merchant Marine Deck Officers (2nd and 3rd Mate) (4-1-77).
CG-101-2	Specimen Examinations for Merchant Marine Deck Officers (Master and Chief Mate) (7-1-78).
CG-108	Rules and Regulations for Military Explosives and Hazardous Munitions (4-1-72). FR 7-21-72, 12-1-72, 6-18-75.
CG-115	Marine Engineering Regulations (8-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78, 3-12-79, 5-3-79.
CG-123	Rules and Regulations for Tank Vessels (8-1-77). Ch-1, 4-78. FR 8-18-77, 9-12-77, 9-26-77, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79, 11-19-79.
CG-169	Navigation Rules - International - Inland (5-1-77). FR 7-11-77, 7-14-77, 9-26-77, 10-12-77, 11-3-77, 12-6-77, 12-15-77, 3-16-78.
CG-169-1	Colregs Demarcation Lines (7-15-77).
CG-172	Rules of the Road - Great Lakes (7-1-72). FR 10-6-72, 11-4-72, 1-16-73, 1-29-73, 5-8-73, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 1-13-77, 11-3-77, 12-6-77.
CG-174	Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products (9-1-76).
CG-175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3-1-73).
** CG-176	Load Line Regulations (2-1-71). FR 10-1-71, 5-10-73, 7-10-74, 10-14-75, 12-8-75, 1-8-76.
CG-177	Yacht Admeasurement and Documentation (9-72).
CG-182-1	Specimen Examinations for Merchant Marine Engineers License (2nd and 3rd Assistant) (4-75).
CG-182-2	Specimen Examinations for Merchant Marine Engineer Licenses; First Assistant Engineer, Steam and Motor, any Horsepower (4-76).
CG-182-3	Specimen Examinations for Merchant Marine Engineer Licenses; Chief Engineer Steam and Motor, any Horsepower (4-76).
CG-184	Rules of the Road--Western Rivers (8-1-72). FR 9-12-72, 12-28-72, 3-8-74, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 3-1-76, 6-10-76, 7-11-77, 12-6-77, 12-15-77.
* CG-190	Equipment Lists (8-1-77).
CG-191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (11-1-76). FR 3-3-77, 8-8-77, 4-9-79, 12-6-79.
CG-227	Laws Governing Marine Inspection (7-1-75).
CG-239	Security of Vessels and Waterfront Facilities (5-1-74). FR 5-15-74, 5-24-74, 8-15-74, 9-5-74, 9-9-74, 12-3-74, 1-6-75, 1-29-75, 4-22-75, 7-2-75, 7-7-75, 7-24-75, 10-1-75, 10-8-75, 6-3-76, 9-27-76, 2-3-77, 3-31-77, 7-14-77, 7-28-77, 9-22-77, 9-26-77, 12-19-77, 1-6-78, 1-16-78, 3-2-78, 11-16-78, 1-22-79, 1-25-79, 2-12-79, 11-5-79, 12-10-79.
CG-242	International Conventions & Conferences on Marine Safety (6-51).
* CG-257	Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-77). Ch-1, 3-17-78. FR 9-26-77, 10-10-78, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79.
CG-258	Rules and Regulations for Uninspected Vessels (4-77). Ch-1, 3-17-78. FR 6-14-79, 7-2-79, 12-17-79.
CG-259	Electrical Engineering Regulations (7-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78.
CG-268	Rules and Regulations for Manning of Vessels (7-1-77). FR 11-19-79.
CG-293	Miscellaneous Electrical Equipment List (6-73).
CG-323	Rules and Regulations for Small Passenger Vessels (7-1-77). Ch-1 3-17-78. FR 10-25-77, 7-17-78, 3-12-79, 6-14-79, 7-2-79, 12-13-79.
CG-329	Fire Fighting Manual for Tank Vessels (1-1-74).
CG-388	Chemical Data Guide for Bulk Shipment by Water (1976).
CG-403	Great Lakes Pilotage Regulations (7-76).
CG-439	Bridge to Bridge Radiotelephone Communications (12-1-72). FR 12-28-72, 3-8-74, 5-5-75, 7-11-77.
CG-467	Specimen Examinations for Uninspected Towing Vessel Operators (10-1-74).
CG-474	When You Enter That Cargo Tank (3-76).
CG-478	Liquefied Natural Gas, Views and Practices, Policy and Safety (2-76).
CG-480	Oil Pollution Control for Tankermen (6-75).
CG-482	Benzene Safe Handling Practices (12-76).
CG-486	Shippers Guide to Hazardous Materials Regulations (Water Mode) (8-77).
CG-491	Safety for Small Passenger Vessels (8-77).
OLD CG-497,	Rules and Regulations for Recreational Boating (12-78), now M 16752.2 (12-78) FR 7-19-79.
*** CG-515	Rules and Regulations for Foreign Vessels Operating in the Navigable Waters of the U.S. (2-78). FR 1976--7-8, 8-26, 9-16, 9-20, 12-13. 1977--1-3, 3-31, 5-19, 6-16, 7-7, 7-14, 7-21, 7-25, 8-4, 8-11, 9-8, 9-12, 9-22, 9-26, 9-29, 11-10, 12-8, 12-15, 12-19. 1978--4-6, 5-18, 5-22, 6-29, 7-24, 9-25, 11-16, 11-20, 11-30, 12-7, 12-28. 1979--1-22, 1-25, 2-5, 2-12, 2-26, 3-29, 4-12, 4-16, 5-3, 5-7, 5-31, 6-14, 8-2, 8-16, 8-27, 9-4, 9-24, 10-15, 10-18, 11-1, 11-5, 11-19, 12-3, 12-10, 12-27.
CG-518	Marine Investigating Officer's Regulations Handbook (2-78). FR 2-16-78, 4-27-78, 5-25-78, 6-15-78, 9-25-78, 10-19-78, 11-20-78, 1-25-79, 7-19-79, 9-4-79.
CG-526	Utilizing the Packaged Hazardous Materials Regulations, 49 CFR (5-78).
Safety of Life at Sea:	Convention, with Regulations, London, June 17, 1960.
Specifications for Merchant Vessel Equipment	(Subparts of Chapter Q, 46 CFR, parts 160 to 164.

*Temporarily out of stock
**Under revision--can be found in Title 46 CFR Parts 41-69
***Available only through the Superintendent of Documents

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PROCEEDINGS
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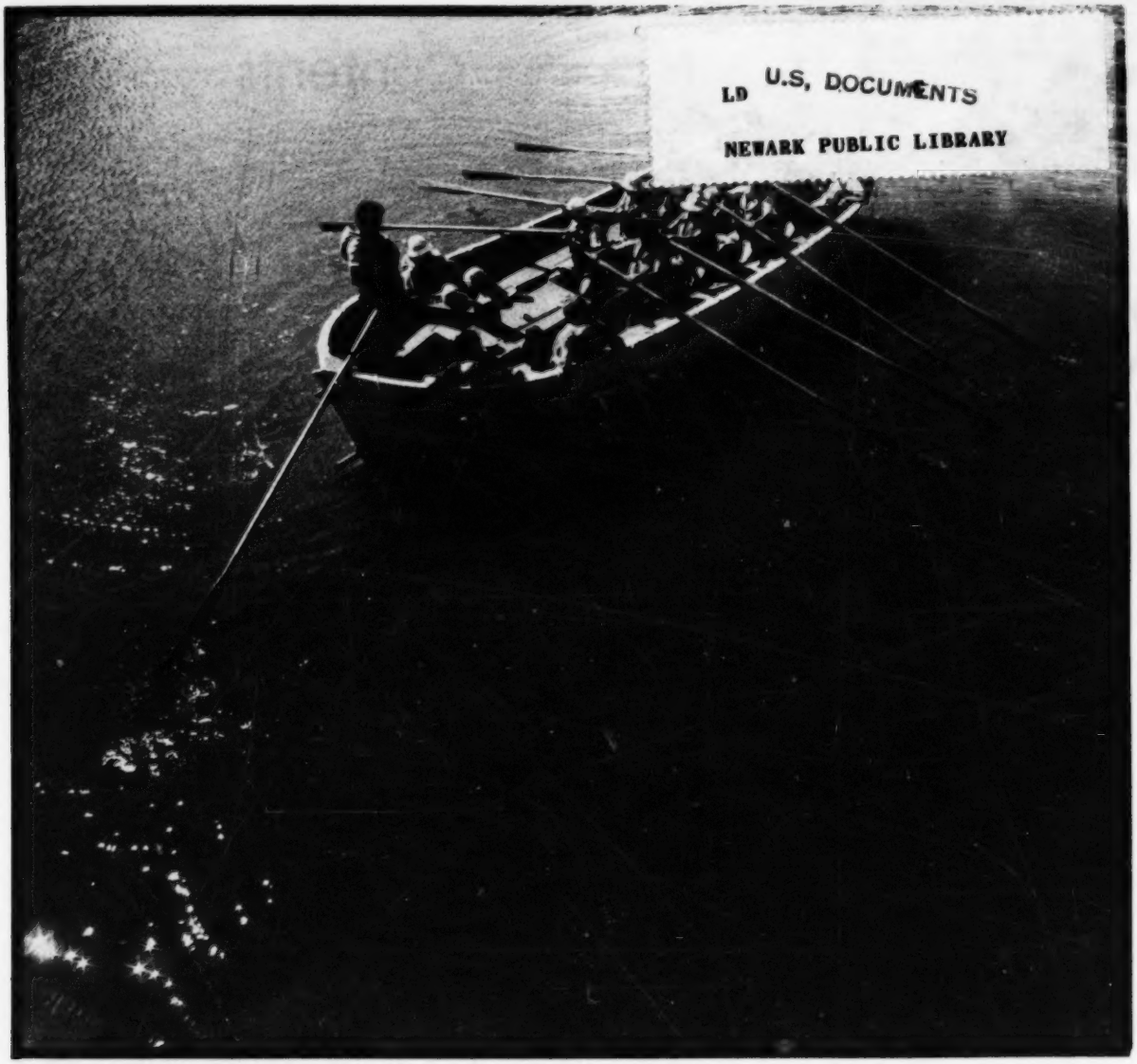

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PROCEEDINGS
OF THE MARINE SAFETY COUNCIL

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Commandant

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cover

Cadet engineers of the Calhoon MEBA Engineering School must complete a 56-hour lifeboat course at the school's eastern shore facility. At least 30 hours are spent in a lifeboat in the water. Additionally, seminars on safety of life at sea are conducted periodically at the Baltimore campus. Read more about the Calhoun MEBA School beginning on page 56.

maritime sidelights

AMERICANS CREW FOREIGN-FLAG LNG SHIP

A novel twist in the manning of a liquefied natural gas (LNG) vessel occurred recently when the El Paso LNG Company replaced the SONATRACH with American seamen in lieu of Norwegian seamen. The SONATRACH is one of three LNG vessels, owned by the El Paso LNG Company, which have been operating under Liberian registry. The company operates three more U.S.-flag LNG carriers under collective bargaining agreements with the Seafarers International Union (SIU).

In 1978, El Paso LNG Company began its "Algeria I" LNG transportation project with three American and three Norwegian-crewed, Liberian-registry vessels. Although the vessels made essentially the same voyage between Algeria and the East Coast of the United States, the Norwegian-crewed vessels spent considerable time in the shipyard, undergoing repairs.

According to a company spokesman, the El Paso LNG Company chose to change over to all American crews because it was felt they would have better control over operations. The company spokesman also stated that the American seamen are well trained to handle the LNG vessels. The SIU seamen aboard the LNG carriers have been specially trained at the Harry Lundeberg School, a joint union-management school, where LNG-vessel instruction has been offered for several years.

In addition to the SONATRACH, SIU crews will soon man the other two El Paso LNG Company foreign-flag vessels, the CONSOLIDATED and the PAUL KAYSER. Presently, the company has under construction three more LNG vessels scheduled to fly the American flag.

(Reprinted from the January issue of the Transportation Institute Currents)

MARAD MARINE FIREFIGHTING MANUAL AVAILABLE

The Maritime Administration (MARAD) has recently published a 376-page manual covering marine fire prevention, firefighting and fire safety. The MARAD manual contains detailed firefighting techniques, discusses both causes and prevention of shipboard fires, and outlines fire prevention programs. The manual may be purchased for $8.00 per copy from:

U.S. Government Printing Office
Washington, DC 20402

Ask for No. 003-007-000-99-5.

TRANSPORTING CHEMICALS SAFELY

The Chemical Manufacturers Association has released a broad-ranging transportation safety report which describes the chemical industry's efforts to assure greater safety in the transportation of its products. Copies of the report, "Transporting Chemicals Safely: What We're Doing About It," can be obtained from the association at 1825 Connecticut Ave., NW, Washington, DC 20009 or by calling (202) 328-4282.

GREEN OR BLACK BEST BUOY COLOR?

The U.S. Coast Guard plans a nationwide, year-long test to evaluate whether green buoys can be seen better and their color recognized by mariners at greater distances than traditional black buoys.

Test sites throughout the United States have been selected to cover as many types of water conditions, visual backgrounds and classes of users as possible.

Green markings now in use on beacons in the United States have received wide acceptance from mariners. In addition, green buoys have been used for some time outside of North America for various purposes and have proven effective. The special one-year evaluation will attempt to verify if, for U.S. applications, green is more effective than black as a day signal color for buoys.

Green test buoys will begin to appear at various locations between March 1, 1980 and May 31, 1980. These buoys and their locations are:

Providence River Approach Channel in Rhode Island, Lighted Buoy 7

Providence River Channel in Rhode Island, Buoy 21

Upper Mississippi River in the vicinity of St. Louis, Missouri, two specially-deployed test aids

Sandy Hook Channel in New Jersey, Lighted Gong Buoy 5

Deepwater Point Range in Delaware, Lighted Bell Buoy 5D

Craney Island Channel in Virginia, Lighted Buoy 19

Bloody Point Range in Georgia, Lighted Bell Buoy 7

Miami Main Channel in Florida, Lighted Buoy 3

Pascagoula Channel in Mississippi, Lighted Buoy 21

Kelso Marine Terminal Channel in Texas, Buoy 55

East Outer Channel in Michigan, Buoy 5

Green Bay Harbor Entrance Channel in Wisconsin, Lighted Buoy 31

San Diego Bay Channel in California, Lighted Buoy 9

Astoria Crossing in Oregon, Lighted Buoy 37

Swinomish Channel in Washington, North Entrance Buoy 17

Hilo Harbor in Hawaii, Lighted Buoy 3

Wrangell Narrows Channel in Alaska, Buoy 13A

Womens Bay Entrance Channel in Alaska, Lighted Bell Buoy 3

Mariners are encouraged to compare the two colors and send comments in writing to the Coast Guard Aids to Navigation Branch at the nearest Coast Guard District Office. *(Reprinted from the Houston USCG Port Safety Station Marine Safety Newletter)*

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DEPOSITORY 376

key notes

The highlights of this month's Coast Guard rulemaking efforts are the final Pollution Prevention Regulations and the Supplemental Notice of Proposed Rulemaking on SUBCHAPTER J, ELECTRICAL ENGINEERING. The POLLUTION PREVENTION REGULATIONS (CGD 75-124A) appeared on 31 January and became effective 3 March 1980. More recently published (3 March 1980) was the Supplemental Notice on the ELECTRICAL ENGINEERING REGULATIONS (CGD 74-125A), which established a comment period until 17 April 1980.

Additional final rules include the 14 February 1980 final rules on WELDING AND BRAZING (CGD 80-04) and ELIMINATION OF WRANGELL AND SITKA, ALASKA AS PORTS OF DOCUMENTATION (CGD 79-060), and the 11 February rules on SAFETY ORIENTATION OF PASSENGERS (CGD 78-009).

Great Lakes mariners should note that the new Great Lakes Pilotage regulations (CGD 79-138) were published on 28 February. All maritime organizations should note that a MEMO OF UNDERSTANDING has been published between the Coast Guard and the Occupational Safety and Health Administration (OSHA). This item was published on 11 February 1980.

Several proposed rules were published during the last month. The first of these, the proposal for the DEEPWATER PORT SAFETY ZONE (CGD 76-096), was published on 14 February. On 21 February the proposed rules for ELECTRONIC RELATIVE MOTION ANALYZERS (CGD 79-148) were published, followed on 28 February by the proposed rules for TRANSPORTATION OF UNSLAKED LIME (CGD 79-141).

One significant new rulemaking project has been initiated since the last issue. This project, entitled PERSONNEL SAFETY AND HEALTH REQUIREMENTS FOR INDUSTRIAL VESSELS (CGD 80-15), is similar to CGD 79-077, Personnel Job Safety Requirements for Fixed Installations on the Outer Continental Shelf (OCS), in that it deals with OCS safety. This project, however, deals not with the fixed installations but with the vessels engaged in exploration and support operations.

There has also been a withdrawal published since our last issue. On 11 February the Coast Guard withdrew the advanced notice on the NEW ORLEANS VESSEL TRAFFIC SERVICE (VTS), holding the project until the Lower Mississippi River Traffic Study is completed. After completion of the study and its evaluation, Coast Guard action will be resumed.

Any questions regarding regulatory dockets or companies and individuals wishing to speak at public hearings should notify Capt. P. J. Danahy (G-CMC/24), U.S. Coast Guard Headquarters, 2100 Second St. SW, Washington, DC 20593; (202)426-1477.

* * *

QUALIFICATIONS OF THE PERSON IN CHARGE OF OIL TRANSFER OPERATIONS, TANKERMAN REQUIREMENTS CGD 74-44, 74-44a

These regulations will redefine and establish qualifying criteria for the certifying of individuals engaged in the carriage and transfer of dangerous cargoes in bulk.

It has been found that most pollution incidents are the result of personnel error; consequently, the minimum qualifications of persons involved in handling polluting substances should be specified.

As stated in the last issue, these projects have been withdrawn (44 FR 25243). New notices of proposed rulemaking (NPRM's) which were anticipated in June have been delayed and are now scheduled for publication in April of this year under new Coast Guard docket numbers 79-116 and 79-116a.

REVISION OF ELECTRICAL REGULATIONS CGD 74-125

This regulation will constitute a general revision and updating of the electrical regulations to conform with latest technology. It will include steering requirements for vessels other than tank vessels.

This revision is occurring because industrial standards for electrical engineering have changed in the past few years, and the regulations must be brought up to date to reflect current industry practices.

An initial NPRM was published on 27 June, 1977 (42 FR 32700). A supplemental NPRM was published as CGD 74-125A on 3 March, 1980 (Part VII).

NEW TANK BARGE CONSTRUCTION CGD 75-083 UPGRADE OF EXISTING TANK BARGE CONSTRUCTION CGD 75-083a

This action is comprised of two regulatory projects centered on tank barge construction standards. These projects were the result of a Presidential initiative of 17 March 1977, directing a study of the tank barge pollution problem. One project will address new barge construction while the other will pertain to existing barges. Regulatory documents for both will be published at the same time and joint public hearings have been held.

In July 1977, the Coast Guard began a reexamination of the tank barge construction standards. It was determined that new construction would be treated separately from existing barges. An advance notice of proposed rulemaking (ANPRM) was then issued to gather additional data and assess impacts related to existing barges.

The new NPRM on tank barge construction, withdrawing the prior NPRM and the ANPRM for existing tank barges, was published as part VI of the 14 June 1979 Federal Register (44 FR 34440 and 44 FR 34443, respectively).

Public hearings were held on the dockets as follows: 2 August 1979,

Continued on next page.....

Washington, DC; 15 August 1979, Seattle, WA; 23 August 1979, New Orleans, LA; 5 September 1979, Washington, DC; and 7 September 1979, St. Louis, MO. The comments given at the hearings have been incorporated in the docket.

On Thursday, 8 November 1979 a Federal Register notice extended the comment period on the project. This extension was based on the continued public interest and ran to 1 December 1979.

This extension has expired and no further comments will be accepted. A final rule on Tank Barge Construction (CGD 75-083) and an NPRM on Existing Tank Barges (CGD 75-083A) have been postponed pending a study by the National Academy of Sciences. A notice of intent indicating the actions that the Coast Guard plans to take is in clearance at the time of this writing and should be published during March.

Anyone wishing to obtain copies of the rulemaking may do so by contacting Capt. P. J. Danahy, Marine Safety Council (address is given in the introduction to the Keynotes section).

POLLUTION PREVENTION, VESSELS AND OIL TRANSFER REGULATIONS CGD 75-124a

This regulation would reduce accidental or intentional discharge of oil or oily wastes during vessel operations.

The basis of this regulation is threefold. First, there is the need to reduce the number and incidence of oil spills. Second, this regulation will help to clarify the existing rules. Finally, this regulation covers the additional requirement for oil-water separators under the 1973 International Convention for the Prevention of Pollution from Ships.

The NPRM was published on 27 June 1977 (42 FR 32670). A supplemental NPRM was published 27 October 1977 (42 FR 56625) and the final rule was published on 31 January 1980 (95 FR 7156).

DESIGN AND APPROVAL REQUIREMENTS FOR OIL POLLUTION PREVENTION EQUIPMENT CGD 76-088a

These regulations set out specifications and procedures for approving oil-water separators, cargo monitors, bilge monitors and bilge alarms for use on merchant vessels. They are based upon international design and test specifications adopted by the International Maritime Consultative Organization (IMCO) as Resolution A-393X, and provide standards for equipment that is representative of the best technology presently available.

The final rule, published in the 13 September 1979 Federal Register (44 FR 53352), requires that performance testing of prospective equipment must be done by one of the independent testing laboratories designated by the Commandant (G-MMT). The following laboratories have received authorization to commence testing:

Underwriters Laboratories
Tampa, Florida, USA

National Sanitation Foundation
Ann Arbor, Michigan, USA

University of New Castle
New Castle Upon Tyne, UK

The following three regulations, CGD 77-057, CGD 77-058(b)(c)(d), and CGD 77-063, make up the Tanker Safety and Pollution Prevention (TSPP) Regulations. Public hearings have been held on the package, comments were requested and 541 have been received. A notice of delay in publishing the final regulations was published in the 7 June 1979 Federal Register (43 FR 32713). Final rules have been published and appeared in the 19 November 1979 Federal Register (44 FR 66500).

INERT GAS SYSTEM CGD 77-057

This regulation would require certain oil tankers of 20,000 deadweight tons and over to be fitted with inert gas systems.

As part of the President's initiatives to reduce marine pollution, this regulation will reduce the possibility of in-tank explosions which have been the cause of some pollution incidents.

The Inflationary Impact Statement for this regulation was completed in May 1977. An NPRM was published 12 February 1979 (44 FR 8984). Hearings were held 21 March 1979 in Washington, DC and 28 March 1979 in San Francisco, CA; 136 comments were received, have been evaluated, and the final rule has been published.

SEGREGATED BALLAST AND TANK CLEANING REGULATIONS GCD 77-058(b), (c) and (d)

This four-part regulation was initiated when President Carter directed the Secretary of Transportation to issue new rules for oil tanker standards, which were to include segregated ballast on all tankers and double bottoms on all new tankers which call at American ports. The provisions of these proposed regulations have been changed by the February 1978 Intergovernmental Maritime Consultative Organization (IMCO) Conference to include Crude Oil Washing (COW) and Clean Ballast Tanks (CBT).

The NPRM was published 16 May 1977 (42 FR 24868). As a result of the IMCO Tanker and Pollution Prevention Conference of February 1978, a new NPRM was issued on 12 February 1979 (44 FR 8984). Public hearings were then held in March in Washington, DC and San Francisco, CA; 265 comments were received on the docket, and were analyzed and the final rules were formulated. These rules appeared in the Federal Register of 19 November 1979.

STEERING GEAR DESIGN STANDARDS TO PROVIDE REDUNDANCY CGD 77-063

As part of the President's initiatives to reduce pollution, this regulation is needed to help reduce the possibility of a marine collision due to a loss of steering.

Continued on next page.....

KEYNOTES.....

An NPRM was published 16 May 1977 (42 FR 24869). As a result of the IMCO Tanker Safety and Pollution Prevention Conference of February 1978, a new NPRM was issued on 12 February 1979 (44 FR 8984). Public hearings were held on the docket and 138 comments have been received and analyzed and the final rules have been published.

CONSTRUCTION AND EQUIPMENT
EXISTING SELF-PROPELLED
VESSELS CARRYING BULK
LIQUEFIED GASES
CGD 77-069

These regulations would amend the current ones to include the substantive requirements of the "Code for Existing Ships Carrying Liquefied Gases in Bulk," adopted by the Intergovernmental Maritime Consultative Organization (IMCO). The use of liquefied gas has increased, as have the problems associated with it. Due to its unique properties and the dangers associated with them, new regulations are being drafted. The environmental impact statement and regulatory analysis were completed in February 1979 and an NPRM on these regulations is anticipated in early 1980.

LICENSING OF PILOTS
CGD 77-084

This regulation takes into account the problems caused by increased ship size and unusual maneuvering characteristics. The proposal would require recency of service for each route upon which a pilot is authorized to serve, licensing with tonnage limitations commensurate with pilot experience, and consideration of ship-handling simulator training for pilots of very large vessels. A regulatory analysis and work plan were completed in October 1978. An NPRM is expected in April 1980.

REVISION OF 46 CFR 157.20-5
DIVISION INTO THREE WATCH
REGULATION
CGD 78-037

This revision would require an adjustment in vessel manning requirements, to bring them in line with current legislation. It would change the requirements which identify personnel who must be used on the three watches and personnel who may be employed in a day working status. An NPRM formerly scheduled to be published on this docket in January 1980 will not be published, as the docket is being withdrawn.

TANK VESSEL OPERATIONS
REGULATIONS, PUGET SOUND
CGD 78-041

This regulation governs the operation of tank vessels in the Puget Sound area. It was initiated to reduce the possibility of environmental harm resulting from oil spills in Puget Sound. This is to be accomplished by governing the operation of tankers and reducing the risk of collision or grounding.

Former Secretary of Transportation Brock Adams signed a 180-day Interim Rule on 14 March 1978 prohibiting entry of oil tankers in excess of 125,000 deadweight tons in Puget Sound; this appeared in the Federal Register of 23 March 1978 (43 FR 12257). An ANPRM was published 27 March 1978 (43 FR 12840). An extension of the interim rule was published in the Federal Register in order to allow the Coast Guard adequate time to complete this rulemaking.

The public hearings scheduled 11 and 12 June in Seattle, Washington, 13 June in Mt. Vernon, Washington, and 14 June in Port Angeles, Washington have been completed and all the comments received have been entered in the docket files for consideration. The extension of the interim navigation rule was published 21 June 1979 (44 FR 36174). This extension was effective 1 July and will be in effect until the Coast Guard prints notice of its cancellation. Copies of documents or the transcripts of the hearings may be obtained by writing to the Marine Safety Council. A final rule on the docket is currently expected in July 1980.

EIGHT-HOUR DAY
VOLUNTARY OVERTIME
CGD 78-146

This docket is a review of the Eight Hour Day, Voluntary Overtime regulation in 46 CFR 157.20-10, which states that no licensed officer should be required to be on duty more than eight hours per day except in extraordinary circumstances. Existing regulations, however, do not address overtime or consider any possible "fatigue factor." Recent Coast Guard studies have shown that this factor has a profound effect on reaction time and judgement, therefore the regulation is currently being reviewed and is in the process of being withdrawn.

PERSONNEL JOB SAFETY
REQUIREMENTS FOR FIXED
INSTALLATIONS ON THE
OUTER CONTINENTAL SHELF
CGD 79-077

This regulation is concerned with the health and safety requirements for installations engaged in oil field exploration and development. This action was mandated by pending Outer Continental Shelf legislation. It will provide more comprehensive protection for personnel employed in vessels and installations in the oil trade. The work plan received by the Marine Safety Council (MSC) in early July calls for an NPRM in March 1980.

SHIPBOARD NOISE
ABATEMENT STANDARDS
CGD 79-134

These standards will establish acceptable sound levels for each of the various vessel compartments based on the latest technology. The standards will differentiate acceptable sound levels for both existing vessels and new vessels, acceptable methods of compliance, and will establish a hearing conservation program.

During the development of these standards, the U.S. Naval Ocean Systems Center (NOSC), San Diego, California was contracted by the Coast Guard to evaluate

Continued on next page.....

sound levels aboard several U.S. merchant vessels, to study the data obtained, and then to define the extent of the noise problem. Based on this data and other information available, they were asked to recommend a set of noise levels to be used in the control and/or elimination of the shipboard noise problem for the proposed standards.

This study has been completed. Copies are available through the National Technical Information Service (NTIS), Springfield, Virginia 22161; request NOSC technical documents numbers 243, 254, 257, 267 and 405.

PERSONNEL AND MANNING STANDARDS FOR FOREIGN VESSELS CGD 79-081

This regulation, deemed necessary to reduce the probability of oil spills, would establish minimum manning levels for foreign tank vessels operating in U.S. navigable waters. It would also establish procedures for the verification of training, qualification and watchkeeping standards. As we go to press, an NPRM is pending.

PERSONNEL SAFETY AND HEALTH REQUIREMENTS FOR INDUSTRIAL VESSELS CGD 80-15

Similar to 79-077, this regulation covers the vessels engaged in exploration, supply and support on the Outer Continental Shelf (OCS). Mandated by pending OCS legislation, this project covers the growing fleet of vessels which perform the variety of industrial functions involved in the exploration and development of offshore resources. The regulations, designed to provide a more comprehensive personnel protection, are scheduled for an advanced notice of proposed rulemaking (ANPRM) in October 1980.

A complete listing of all Coast Guard proposed regulations, both "significant" and "non-significant," appeared in the Thursday, February 22, 1980 Federal Register (45 FR 13312).

THE COAST GUARD HAS NO PUBLIC HEARINGS SCHEDULED AT THIS TIME FOR MARCH OR APRIL

WORLD MARITIME DAY

March 17 is World Maritime Day. This date was selected in 1978 by the International Maritime Consultative Organization (IMCO), the United Nations maritime agency. Coincidentally, this March 17 also marks the 64th anniversary of the first rescue of the newly formed United States Coast Guard. Members of the Cape Lookout, North Carolina station performed the historic rescue back in 1916.

Bill Cosby says: "When you learn CPR, you're ready to save lives– anywhere."

American Red Cross

A Public Service of This Magazine & The Advertising Council

"and after your half-hour break, the Captain wants to go waterskiing!"

THE CALHOON MEBA ENGINEERING SCHOOL

In 1966, an unprecedented labor-management venture gave life to a unique educational institution--the Calhoon MEBA Engineering School. Through the combined efforts of the Marine Engineers Beneficial Association, which is the oldest maritime union in the United States, and contracted steamship companies, the new school for marine engineers was officially opened that autumn. It was named in honor of Jesse M. Calhoon, president of the National Marine Engineers Beneficial Association (MEBA) since 1963. Mr. Calhoon envisoned a growing demand within the maritime industry for skilled, qualified marine engineers; in addition, he believed that continuing education would become essential as jobs and equipment increased in complexity. In order to meet the needs of the maritime industry during the Vietnamese "build-up," the school started with a two-year "crash program."

The Calhoon School occupies all 14 floors of what was previously an elegant downtown hotel, now renovated for school use. The top floors are reserved for student lodging and classrooms. The 14th floor, where a gym and recreation rooms are located, provides an excellent view of the busy, modern port of Baltimore. There is no charge for room, board or tuition, although students must purchase textbooks and other required classroom materials. Cadet engineers enrolled at the school receive a small monthly allowance to cover these and other necessities. Recently, the school has expanded to include another campus at Easton, on Maryland's historically renowned Eastern Shore.

Every two months a group of about 35 men and women begin the intensive three-year training program of the Calhoon School. The successful ones, well-trained professionals, will become marine engineers on freighters, tankers, bulk carriers and passenger ships world wide, plus numerous river, harbor and coastal vessels.

A marine engineer is essentially responsible for the life of his ship. He maintains and operates the engines, machinery and equipment aboard, including sophisticated electronic equipment. Therefore, an engineering officer must know more about shipboard systems than anyone else on the ship--propulsion engines, generators, boilers, refrigeration, air conditioning, sanitation systems, deck machinery, electrical systems, electronic equipment. No small feat! Understandably, development of the necessary technical skills requires a good deal of time, effort and intelligence. Each graduate of the Calhoon School's program has received more than 1,900 hours of class instruction and over 1,100 hours of practical skills training, in addition to a full year of sea duty.

Entry requirements for the Calhoon School are high and competition is stiff. Applicants must be between the ages of 17 and 31, have a high school diploma, and submit a transcript of their grades. Good grades in math and science studies are essential. Due to the strenuous work demanded of engineering officers, applicants must also be in good physical condition.

Although Calhoon School graduates do not receive a college degree, the school is approved by the Maryland Board of Higher Education and courses are conducted at college level. Should a graduate decide, later on, to acquire a degree in addition to his training and experience, some universities may grant partial credit for the courses studied at Calhoon. Recommendation for credits is made by the American Council on Education; acceptance depends on the individual institution and other factors, such as relevancy to the particular degree program chosen.

The total program at the school combines classroom and shipboard instruction, and includes travel to numerous foreign ports. It is divided into three phases conducted by six different departments.

The Electrical Department's courses range from fundamental concepts of electricity through advanced subjects, such as automated shipboard controls.

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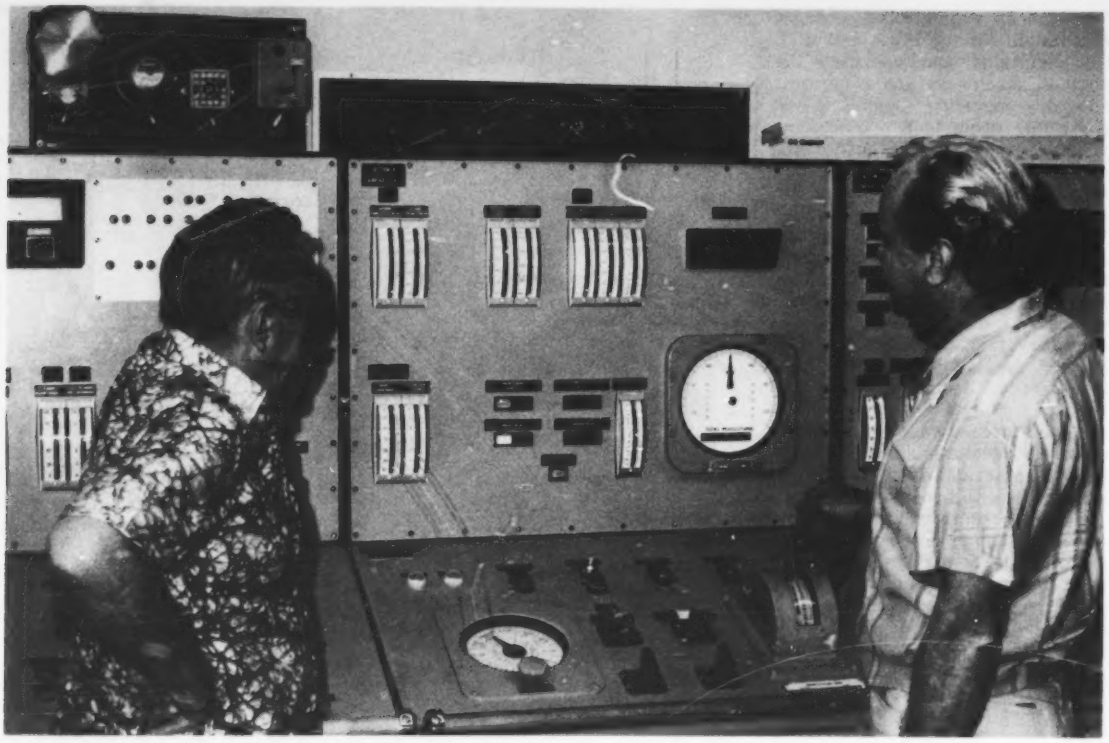
ABOVE: A cadet engineer collects data from an electronics course experiment.
BELOW: Student engineers in the electricity course conduct lab experiments using training aids.



Student engineers in the applied electronics course operate the propulsion section of a ship's engine room console.

General Studies are comprised of specialized courses in lifeboat training to prepare students for the U.S. Coast Guard Lifeboatman's Examination; safety and firefighting, including training at the Firefighting School in Earle, New Jersey; ship construction and ship management; labor relations; license upgrading; and an innovative approach to first aid, tailored to meet typical shipboard emergencies (see "Heart Attacks at Sea: How Big A Problem?" in the February 1979 *Proceedings*).

The Industrial Arts Department teaches benchwork and welding and the use of machine tools, and stresses repair of marine machinery. All students must be qualified to take and pass the A.S.M.E. welding exam. Since not all parts or tools may be available in the event of a breakdown at sea, engineering officers must be able to make not only the necessary parts but, at times, the tools needed to make those parts.

The department of Marine Engineering covers both the theory and operation of ships' machinery and systems. Classroom and laboratory instruction focuses on the operation and maintenance of shipboard auxiliary equipment, marine steam generators and turbines, diesel and gas turbine engines, refrigeration, air conditioning and heating systems, hydraulics and pneumatic power equipment, marine control systems, and modern marine power systems.

The Mathematics and Science Department offers a review of advanced high school mathematics and sciences and progresses to topics such as thermodynamics, marine chemistry, engineering materials and blueprint reading.

The Physical Education Department has complete gym facilities. Participation is encouraged in popular competitive sports.

Entry-level cadets must pass through three phases of training at the Calhoon School. During their first six months (**Phase I**) the students gain practical skills and basic knowledge in preparation for sea training. They alternate between the Baltimore and Easton campuses while undergoing intensive familiarization with every shipboard duty expected of a marine engineer. During Phase I the cadets are introduced to machine shop, welding and benchwork, and are taught firefighting and lifeboat handling. Additionally, basic courses in auxiliary equipment, main propulsion machinery and electricity are taught. All of the subjects taught during Phase I prepare the cadet engineers to be contributing members of a ship's crew during Phase II.

The cadet engineer must complete a machine shop course which consists of 304 hours of welding, operating a lathe, shaper, drill press and milling machine and other equipment found in the machine shop of a modern ship.

Phase II provides cadets with a full year of sea-going engineroom experience on at least three different vessels. While at sea, cadets must also complete correspondence courses covering main propulsion, auxiliary machinery, electricity, safety and firefighting, and mathematics.

Finally, students return to shore for **Phase III,** the longest and perhaps the most demanding part of the school's program. For 18 months, they attend advanced classes in ship construction, hydraulics, pneumatics, advanced propulsion systems, and many other difficult topics. A marine engineer must be much more than a mechanic--these cadets will soon be ships' officers with many men working for them. Therefore, in preparation for such responsibility, Phase III includes courses in ship's management and business, labor relations, and first aid.

In addition to the Calhoon School's entry-level program, the school is involved in the important business of continuing education. Advanced training is available for licensed marine engineers who must keep up with the latest developments in their field and the new equipment being installed on ships. Some classes, particularly the basic LNG course, are also attended by deck officers and radio officers. Each year, hundreds of MEBA members take advantage of the school's advanced training programs. Courses offered vary according to need, but usually include an electrical course, welding, applied electronics, LNG fundamentals, refrigeration and air conditioning, and diesel theory and operation. An upgrading course is also available to assist members in preparing for Coast Guard licensing examinations.

Obviously, the Calhoon MEBA Engineering School is no snap. As the school catalog points out, nothing worthwhile ever is. Success is not guaranteed upon graduation--that's when the work really begins! Calhoon School graduates are not placed, but must procure their jobs through local union hiring halls. Although there is no tuition at the school, students do incur an obligation to MEBA for their education. To meet this training obligation, they must work at least 200 days per year for three consecutive years as a marine engineer aboard an MEBA-contracted vessel. Nonetheless, it looks like all the hard work, time and study must be worth it in the long run. After completing their obligation requirements, an incredible 95 percent of Calhoon graduates of the

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CALHOON.....

three-year program, which began on August 13, 1970, remain in the field of marine engineering. The marine engineer's role in operating the merchant fleets of our nation is, apparently, a rewarding and fulfilling life.

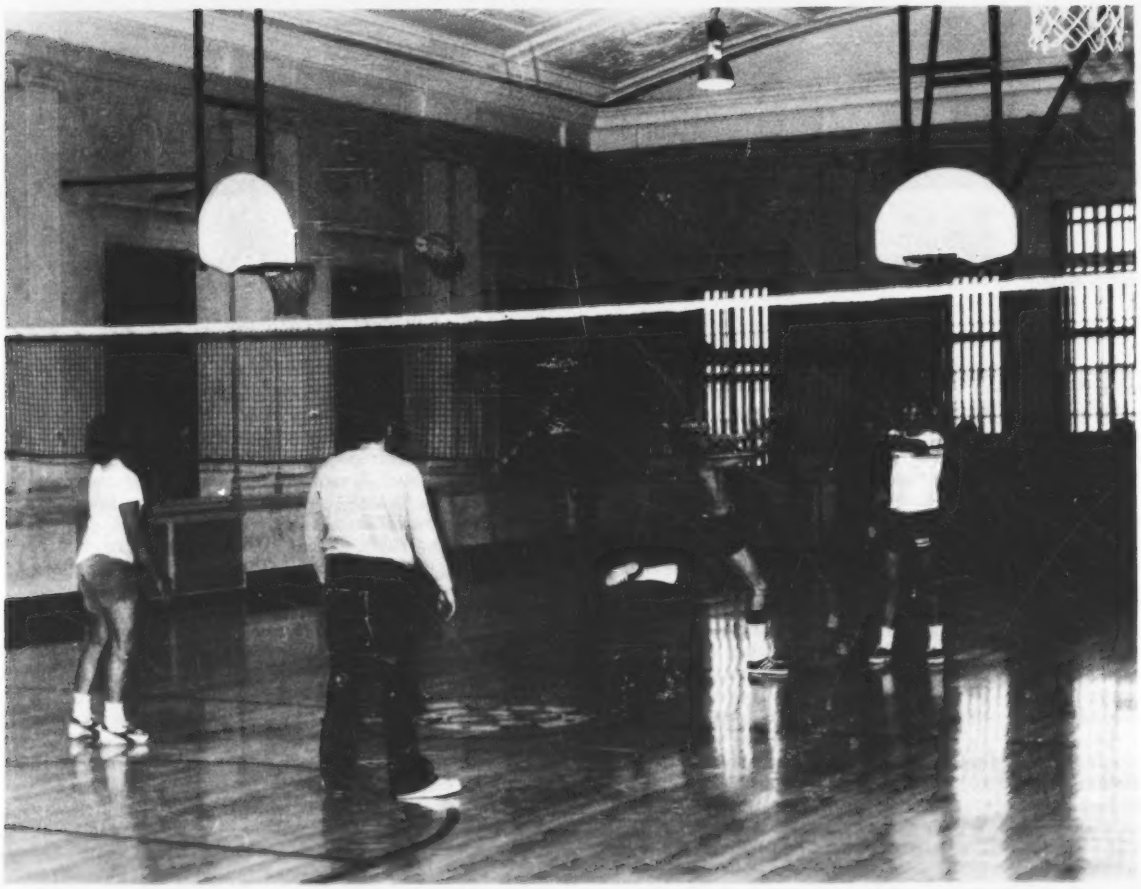
For further information about the Calhoon School, contact:

Calhoon MEBA Engineering School
9 Light Street
Baltimore, Maryland 21202
(301) 727-5350

This is the second in a series of articles on marine-related schools and organizations. The purpose of these articles is to familiarize readers with existing institutions, explaining exactly what they are and what they do, and who is eligible to join/attend.

If you would like to submit information on a particular school or organization, please write to: Commandant (G-CMC/24), U.S. Coast Guard Headquarters, Washington, DC 20593 or call (202) 426-1477.

Recreational activities of all types are conducted in the spacious gymnasium of the school.



Lessons from Casualties

Recently, a gasoline tank aboard a fishing vessel exploded, injuring three men. The vessel, a 240-foot tuna boat, was in a southern U.S. shipyard where it had been undergoing repairs for many weeks prior to the casualty. The vessel has three freestanding gasoline tanks (7' x 5' x 4') located on the starboard side of the after wet deck (a semi-enclosed area between the main deck and the tops of the fish wells). The tanks stand about 4 inches off the tops of the fishwells and are about one foot inboard of the vessel's starboard shellplate. They are solidly constructed of 3/8-inch steel plate with no accesses or inspection plates and are connected by a common suction line and common vent.

The explosion occurred while hot work was being done in the vicinity of No. 1 and No. 2 gas tanks. A pipefitter, standing between the two tanks, was welding a new water discharge line to the vessel's shellplate when No. 1 gas tank exploded. He was welding about 3 feet above the deck, 2 feet aft and 1 foot outboard of No. 1 tank. No hot work was being done on the tank itself or on its lines or vents.

The vessel had entered the shipyard nine weeks earlier. Upon arrival, the gasoline tanks had been drained. The tanks, with their lines and vents, were flushed with water, blown dry with air, and then completely filled with water. A marine chemist's certificate was then issued stating that it was safe to remove the vessel's shellplate immediately outboard of the gas tanks. No hot work was authorized on the tanks, their lines or vents. The shell plate removal was completed three or four days later. No subsequent marine chemist certificate was issued for the gas tanks or the wet deck area.

Two months later, upon completion of major repair work, the vessel sailed for a single day of sea trials. During the sea trials, the water was drained from the gas tanks by crew personnel. Three days later, the explosion occurred in the empty No. 1 tank.

The force of the explosion blew the top off the tank and wedged it against the overhead. The common vent and suction lines which ran above the tanks were ruptured and pinned to the overhead by the tank top. The sides of the tank were bowed but intact. There was no indication of fire following the explosion. Immediately after the explosion, the atmosphere in No. 1 tank was measured by a marine chemist. At the top of the tank, gasoline vapors were present in concentrations within the explosive range. At the bottom of the tank, gasoline vapor concentrations exceeded the upper explosive limit. The tank itself was empty, but there was a layer of sediment evenly covering the tank bottom.

The atmospheres within the empty No. 2 and No. 3 gas tanks were also measured to be within the explosive range. In fact, a reading of 25 percent of the lower explosive limit was obtained from within a newly installed fourth gas tank, which had never contained gasoline but was connected to the other three tanks by a common suction line!

This explosion provided a vivid demonstration that even though the sediment in No. 1 gas tank had been under water for many weeks, it still retained enough gasoline to generate explosive vapors once the water was removed. These vapors probably leaked through the drain valve of No. 1 tank and traveled the short distance to the source of ignition--the welding arc at the shellplate. The pipefitters, who had been burning and welding around the gasoline tanks for weeks, were unaware that the tanks had been recently emptied during sea trials. Evidently the welding of the water discharge line was a late addition to the work list, and the shipyard's safety department was unaware that any more hot work was needed in the vessel's wet deck area.

Improved communications between the shipyard's production and safety staffs and stricter in-yard controls of hot work procedures may have prevented this accident.

ABOVE: Chuck Warren rescues "victim" Sherry Claytor. RIGHT: After administering mouth-to-mouth resuscitation, Warren signals for instructors Hill and Seward to tow him and Claytor toward the boat, while he begins cardiopulmonary resuscitation. The entire recovery took less than one minute.

THE PETALUMA EXPERIENCE

By Dale L. Puckett
Audiovisual Branch
U.S. Coast Guard Headquarters, Washington, DC

Coast Guard Aviation Structual Mechanic Chuck Warren flexed his knees as the 44-foot motor lifeboat took another roll. Fifty-six degree Pacific ocean water rushed over the gunnel.

Fifty yards from the lifeboat Sherry Claytor, a volunteer victim and wife of a Coast Guard yeoman, waited. Several times a minute she disappeared behind seven-foot swells.

Coast Guard Physician's Assistant Casey Hill pushed the button on his stop watch.

"Go," he yelled.

Warren jumped into the water and swam toward Claytor. She was now floating face down in the water.

When Warren reached the "victim," he quickly flipped her over. Keeping her afloat with one hand and pinching her nostrils closed with the other, he gave her four quick breaths of mouth-to-mouth resuscitation. Seconds later, Warren had positioned himself behind Claytor. His left arm held her on the surface of the water, his right went into the air.

With this signal, Aviation Machinist's Mate Les Seward began pulling the line attached to Warren's swimmer's harness. As he was being towed toward the boat, Warren wrapped both arms around Claytor from behind, grabbed his doubled left fist with his right hand, and began compressing her chest 80 times per minute. He was demonstrating in-water cardio-pulmonary resuscitation (CPR).

"Five yards," Seward yelled as Warren and his patient approached the boat.

Warren moved to Claytor's side and gave her two more ventilations. Then, he held her in position while Seward pulled and a second later Claytor was in the boat.

"Fifty-six seconds," Hill shouted over the sound of the surf and the boat's engines. "We're getting better."

It was Thursday afternoon of the second week of the Coast Guard's Emergency Medical Technician (EMT) School and 33 students watched. In less than an hour they would be wearing wet suits and getting first hand experience with these new water rescue techniques in the calmer water near the Bodega Bay, California Coast Guard station. They would master in-water patient evaluation and management and learn how to remove an injured victim from the water in a stoke's litter.

Continued on next page.....

PETALUMA.....

The Coast Guard's reason for establishing the new EMT school at its Petaluma, California training center is based on the assumption that a few minutes could make a lifetime of difference.

For years, the service has had the reputation of rescuing people and property at sea. But in the past, except at large stations where hospital corpsmen were available, most medical care had to wait until after the patient was delivered to a shore-based hospital.

The Coast Guard was no different than most landlocked ambulance services on the nation's highways which, up until six or seven years ago, simply cut an accident victim from the vehicle and delivered him to a hospital for treatment. Even the prestigious American Medical Association only recently recognized emergency medicine as a speciality field.

Now, the Coast Guard has defined an Emergency Medical System (EMS). It includes trained emergency medical technicians and hospital corpsmen, emergency medical gear and medical formats for radio communications as well as Search and Rescue (SAR) vessels and aircraft.

"The trained EMT is the most important part of the system," said Hospital Corpsman Ken Beck, another instructor. "Without him, the patient would not live long enough to get into the rest of the Emergency Medical System."

To beef up the important personnel component of its emergency medical system, Coast Guard Commandant Admiral J. B. Hayes has set a goal of having at least one EMT crewmember on every SAR mission. To accomplish this goal he must have over 1,400 EMT's stationed at the service's 318 SAR units.

These figures translate to five EMT-trained SAR aircrewmen per air station and five EMT crewmen per lifeboat station, plus two EMT cuttermen on each Coast Guard cutter.

To the seven instructors here, it means giving hands-on training to more than 400 students each year. To the 33 students in each class, it means 17 consecutive, 14-hour days of study and hard work. To the commercial mariner and recreational boater, it means the best possible emergency medical assistance is available when needed.

Students who successfully complete the intensive training are rewarded with Department of Transportation certification as a basic EMT, the same certification in 23 states, a special Coast Guard qualification code and the knowledge that they are truly qualified to save the life of a fellow human being. Says instructor Curt Mauck, "Saving a life is addictive."

Instructor Curt Mauck helps test new in-water resuscitation techniques on a "Resusci-Anne" mannequin.

PETALUMA.....

The Petaluma school itself is unique for several reasons. It is the largest EMT school nationwide and the only servicewide EMT school among the uniformed services. More importantly, however, its curriculum is specifically oriented toward Coast Guard SAR operations.

While most civilian EMT courses teach ambulance-based personnel working at the scene of highway accidents or in-home emergencies, this course is aimed at the specifics of emergency care aboard Coast Guard aircraft and vessels.

Topics taught here which go untouched at most civilian EMT schools include hypothermia, cold-water survival, near-drowning and diving accidents, as well as the extrication and management of victims of aircraft and vessel accidents.

To the uninitiated, the training is so intense that it leaves a queasy stomach.

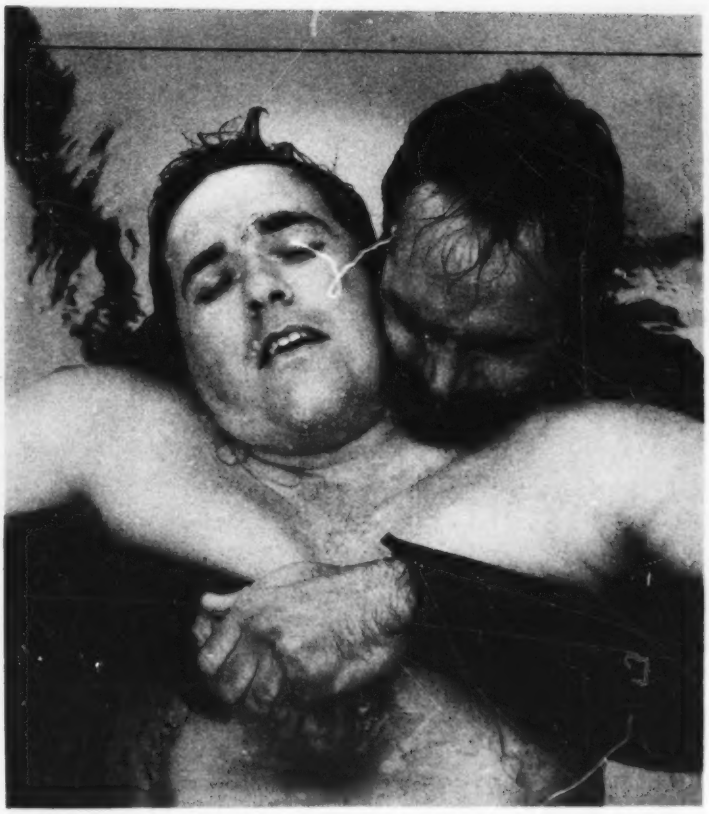
For example, the class which witnessed Thursday's in-water CPR demonstration barely had time to recover from the cold water of Bodega Bay before being thrown into the fire of a simulated mass disaster.

When they returned from lunch on Friday, instructors Les Seward and Larry Young grabbed 11 students and hustled them into an unused classroom with the shades drawn. While the others were reviewing the rules for the exercise, Seward and Young used plastic makeup called "moulage" and fake blood to turn the parking lot next to the school into a ghastly scene of blood and gore.

Technically the scenario was simple. A plane had crashed into a parking lot. The pilot, obviously dead, had a major throat laceration. The co-pilot had a lacerated forehead and a protruding eye.

Other victims had chest injuries, eviscerations, hearts attacks and burns. There was even a pregnant woman delivering prematurely. Fake blood gushed from gashes called "pumpers" or arterial wounds, staining the concrete to a tomato red.

The instructors called the exercise a "triage," a system of sorting and allocation of treatment of patients in a battle or disaster according to specific priorities. They carried clipboards and closely noted each student's technique.



Curt Mauck helps test new in-water resuscitation technique on fellow-instructor Chuck Warren.

Another instructor, Radioman Jerry Newcomer, was intent on creating additional chaos as he manned a 2½-inch fire hose connected to a bright yellow fire truck. Red and blue lights flashed. The sound of a siren pierced the ear. Over 150 gallons of water per minute poured onto the plane, the parking lot and anything or anybody in the way.

Behind Newcomer a casualty was pinned beneath the plane's propeller. He was moaning loudly when a student ran to his side.

"I'm Beverly Harris from the Coast Guard. I'm an emergency medical technician and I'm here to help. Can you tell me what's wrong," she said.

While she was talking, she quickly surveyed the patient's condition.

"I can't move! My chest! I can't stand it!" he said between moans.

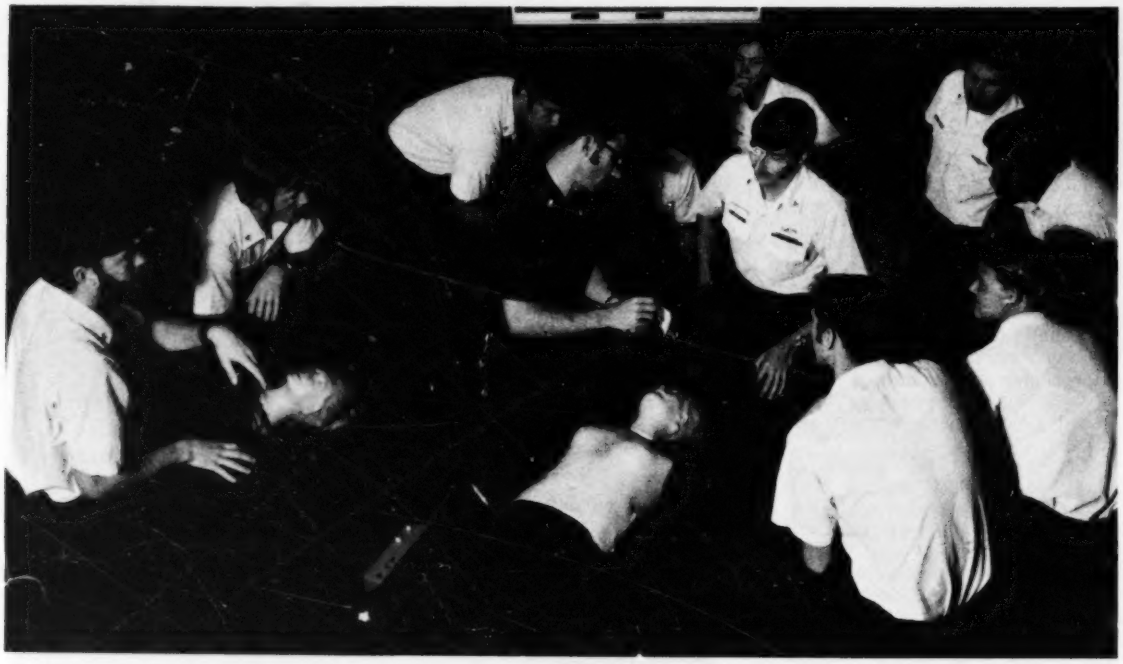
"Try to relax and don't try to move. I'm going to put a dressing on your chest," she said.

A minute later she had finished the bandaging and moved on to another victim. Fifteen minutes later, Ken Beck blew the whistle. The nightmare was over. Harris had treated five more victims.

The responsibility placed on the shoulders of the 18- to 23-year-old SAR crewmen is awesome, but the pressure is creating additional benefits.

"It really hits them on graduation day," Newcomer said. "They have earned the qualification code.

Continued on next page.....



ABOVE: Instructor Jerry Newcomer evaluates student performance on data tape recorded by a "Resusci-Anne" mannequin during CPR training. BELOW LEFT: Newcomer reads a CPR data tape. BELOW RIGHT: Student Becky Schultz practices with an oxygen-powered resuscitator.

When they go back to the station the rest of the crew will come to them with real questions. They will expect real answers. During a rescue they will be the only person qualified to supply the vital information doctors will need for successful treatment."

Often, lifestyles are changed by the intensity of the Petaluma experience.

"Since we cram a one-semester course into two and a half weeks, we put the students into a pressure situation they haven't experienced since boot camp," Warren said. "We show them they can handle a situation they might have been unsure of before.

"The success carries over into tasks that are not associated with emergency medicine. It makes them fight for a product or a project they believe in. It really makes you feel great to see that we have supplied positive motivation to life in general," he said.

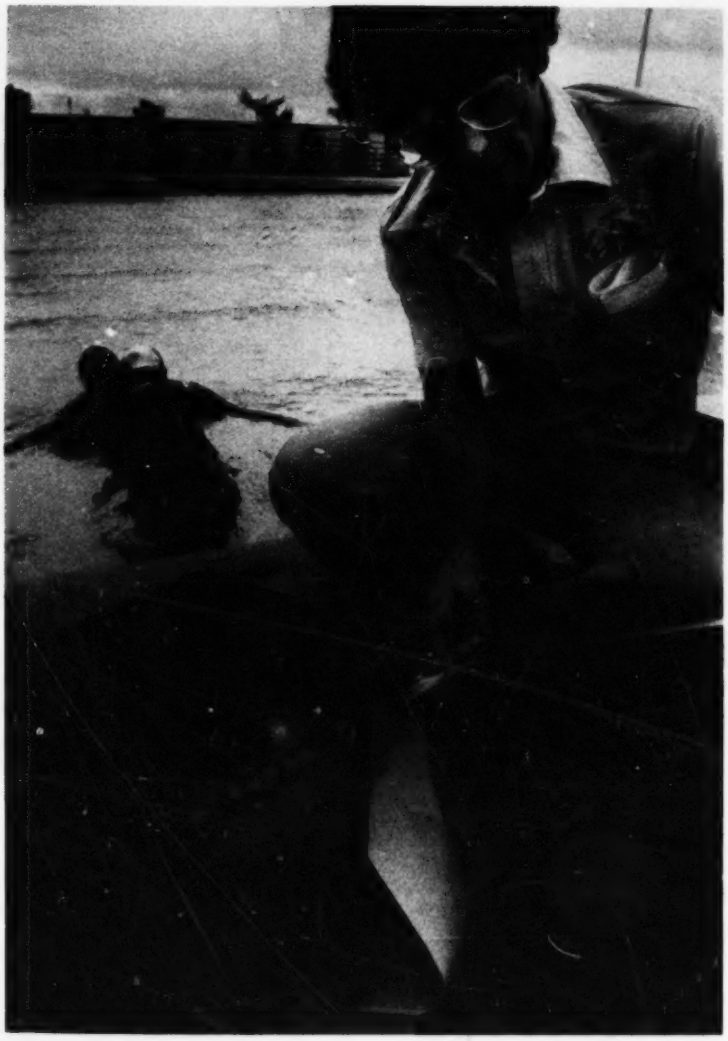
The short time frame also aids retention.

"It makes things clearer in the student's mind," Newcomer said. "They don't have time to sit back and analyze what we are saying so they must take it as gospel. Because of this, they remember what we teach and not what they thought we were teaching."

One of the school's major benefits for the boating public is the development of a standardized format for the transmission of medical information. Newcomer headed that project.

"We worked with the radioman school here and designed a format that is compatible with both the needs of the radioman and the doctor who will use the information," he said. "We teach the format to every EMT so that in the future doctors will get exactly the same information from the Coast Guard in exactly the same order, no matter where they are located. This will aid diagnosis tremendously."

Other benefits to boaters are resulting from the basic medical research conducted by the instructors here. For example, Commander Alan Steinman, Chief of the Operational Medicine Branch at Coast Guard Headquarters and father of the service's EMT program, recently joined with several prominent doctors to gather data designed to document the effectiveness of in-water CPR.



Using a printed readout from an electronic monitor hooked up to an aquatic mannequin, researcher Nico March evaluates the effectiveness of the new in-water CPR technique.

Dr. Martin J. Nemiroff, an assistant professor in the Department of Internal Medicine at the University of Michigan who has successfully revived 17 "near-drowning" victims, and Nico F. March, a University of California at San Diego researcher who built a $30,000 immersible mannequin to measure the sternal deflection rate and other physiological data, joined Dr. Steinman to gather facts needed by the National Research Foundation and the American Heart Association. This research must be done before new techniques can be endorsed and taught to the general public.

Continued on next page.....

Students react at a realistic mass disaster scene staged at the Coast Guard EMT School at Petaluma, California.

PETALUMA.....

"The new aquatic emergency rescue techniques being pioneered here will allow rapid response by trained personnel that will often make the difference between successful rescue and first-aid or certain death," March said.

While the training here continues, Dr. Steinman works to supply every Coast Guard search and rescue unit with a basic EMT kit that measures up to the state of the art. It includes oxygen powered resuscitation and suction equipment, splints, dressings, bandages, a stethoscope and other emergency gear.

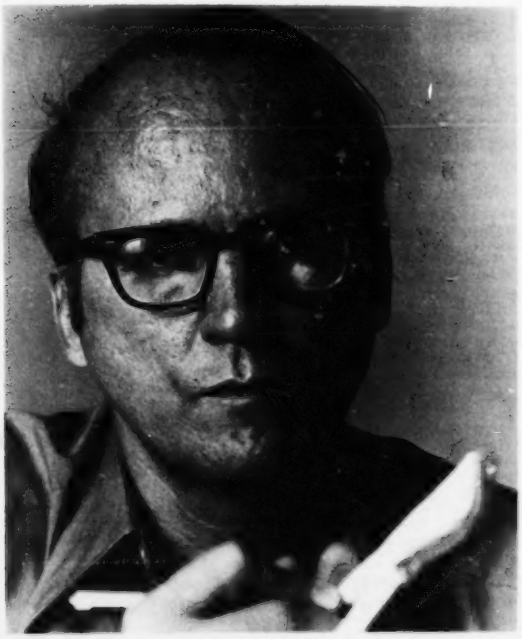
The Petaluma school was one year old January 23. Already, it is paying for itself in lives saved. Dozens of recently documented rescue cases, on both coasts, credit EMT's with saving the lives of boating accident victims.

Whether teaching new water rescue techniques in the cold water of the Pacific, or forcing students to face the blood and gore of a simulated mass disaster, the goal of Dr. Steinman and the Emergency Medical Technician School staff is simply stated: "To provide adequate emergency medical care on every Coast Guard mission requiring patient or survivor rescue and transport."

It is an accomplishment which will instill new meaning to the service's recruiting slogan, "The Lifesavers."

This article was summarized in the Coast Guard Commandant's Bulletin *of December 24, 1979 and was also featured in its entirety in the* Navy Times *on January 28, 1980.*

Moulage (plastic makeup) and fake blood turn simulated disasters into realistic, ghastly scenes.



About the Author

Dale L. Puckett

PAC Dale Puckett holds a Bachelor of Science degree in Radio-TV Film from the University of Kansas and a Master's degree in Management from Webster College in St. Louis. He recently completed the U.S. Navy's Applied Photojournalism program at Syracuse University and is a contributing editor for '68 MICRO JOURNAL, a computer trade publication. He has 12 years of active service with the U.S. Coast Guard and is presently assigned to the U.S.C.G. Photo Team of the Audio-visual Branch at Coast Guard Headquarters.

Nautical Queries

The following items are examples of questions included in the Third Assistant Engineer through Chief Engineer examinations and the Third Mate through Master examinations.

DECK

(1) The magnetic compass magnets are constrained to remain essentially horizontal, and they are acted on only by the

A. horizontal component of the earth's total magnetic force.
B. magnetic poles.
C. ship's magnetism.
D. prime vertical meridian.

REFERENCE: Dutton, 13th Ed.

(2) A gyrocompass is a very reliable instrument, but its accuracy decreases above latitude

A. 60 degrees.
B. 75 degrees.
C. 80 degrees.
D. 85 degrees.

REFERENCE: Dutton, 13th Ed.

(3) The breaking test load of wire rope used with cargo gear having a lifting capacity of 20 tons shall be at least

A. 3 times the safe working load.
B. 4 times the safe working load.
C. 5 times the safe working load.
D. 6 times the safe working load.

REFERENCE: 46 CFR 31.37-35

(4) Damage to cargo caused by fumes or vapors from liquids, gases, or solids is known as

A. vaporization.
B. tainting.
C. oxydation.
D. contamination.

REFERENCE: Saubier

(5) When the dew point of the outside air is lower than or equal to the dew point of the air in the cargo hold you should

A. secure all ventilation.
B. shut down the intake blowers.
C. ventilate the cargo holds.
D. shut down the exhaust blowers.

REFERENCE: Saubier

ENGINEER

(1) As the rate of combustion is increased in a boiler, more steam can be generated because the

A. fires are hotter.
B. weight rate of hot gas flow increases.
C. furnace becomes hotter.
D. temperature difference between the hot gas and the boiler water increases.

REFERENCE: Latham

(2) According to Coast Guard regulations, blowoff piping external to a boiler with a maximum allowable working pressure of 1200 psig will be capable of withstanding a minimum of

A. 1200 psig.
B. 1425 psig.
C. 1500 psig.
D. 1575 psig.

REFERENCE: 46 CFR 56.50-40(b)

(3) What type of heat is removed from the refrigerant in the condenser of an R-12 plant?

A. latent heat of vaporization.
B. heat of compression.
C. superheat.
D. all of the above.

REFERENCE: Principles of Naval Engineering

(4) An accidental path of low resistance which passes an abnormal amount of current is known as a (an)

A. open circuit.
B. short circuit.
C. polarized ground.
D. ground reference point.

REFERENCE: Basic Electricity NAVPERS

(5) In an electrohydraulic steering gear, any change in relative motion between the synchronous receiver and the followup gear results in

A. the pumps going to full stroke.
B. closing of the six way valve.
C. driving the rams up against the stops.
D. a change in pump stroke.

REFERENCE: Naval Aux Machy

ANSWERS

Deck
1. A; 2. B; 3. B; 4. B; 5. C

Engineer
1. B; 2. B; 3. D; 4. B; 5. D

Please note that Deck Question No. 2 of the December 1979 Nautical Queries contained a typographical error. The correct answer to that question is B, not D as indicated. The purpose of a flame safety lamp is to determine the presence of sufficient oxygen to sustain life.

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications may be obtained from the nearest marine safety office, marine inspection office or by writing: **Commandant (G-CMA/TP26), U.S. Coast Guard, Washington, DC 20593.** Because changes to the rules and regulations are made from time to time, these publications can be kept current between revisions only by referring to the Federal Register. (Official changes to all Coast Guard authored federal regulations are published as final rules in the Federal Register on Mondays or Thursdays.) Following the title of each publication in the table below are the dates of the most recent editions and changes, if any.

The Federal Register may be obtained by subscription ($5 per month or $50 per year) or by individual copy (75 cents each) from SupDocs, U.S. Government Printing Office, Washington, DC 20402.

CG No.	TITLE OF PUBLICATION
CG-101-1	Specimen Examinations for Merchant Marine Deck Officers (2nd and 3rd Mate) (4-1-77).
CG-101-2	Specimen Examinations for Merchant Marine Deck Officers (Master and Chief Mate) (7-1-79).
CG-108	Rules and Regulations for Military Explosives and Hazardous Munitions (4-1-72). FR 7-21-72, 12-1-72, 6-18-75.
CG-115	Marine Engineering Regulations (8-1-77). FR 9-28-77, 10-10-78, 11-16-78, 12-4-78, 3-12-79, 5-3-79.
CG-123	Rules and Regulations for Tank Vessels (8-1-77). Ch-1, 4-78. FR 8-18-77, 9-12-77, 9-26-77, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79, 11-19-79, 1-31-80.
CG-169	Navigation Rules - International - Inland (5-1-77). FR 7-11-77, 7-14-77, 9-26-77, 10-12-77, 11-3-77, 12-6-77, 12-15-77, 3-16-78.
CG-169-1	Colregs Demarcation Lines (7-15-77).
CG-172	Rules of the Road - Great Lakes (7-1-72). FR 10-6-72, 11-4-72, 1-16-73, 1-29-73, 5-8-73, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 1-13-77, 11-3-77, 12-6-77.
CG-174	Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products (9-1-76).
CG-175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3-1-73).
•• CG-176	Load Line Regulations (2-1-71). FR 10-1-71, 5-10-73, 7-10-74, 10-14-75, 12-8-75, 1-8-76.
CG-177	Yacht Admeasurement and Documentation (9-72).
CG-182-1	Specimen Examinations for Merchant Marine Engineers License (2nd and 3rd Assistant) (4-75).
CG-182-2	Specimen Examinations for Merchant Marine Engineer Licenses; First Assistant Engineer, Steam and Motor, any Horsepower (4-76).
CG-182-3	Specimen Examinations for Merchant Marine Engineer Licenses; Chief Engineer Steam and Motor, any Horsepower (4-76).
CG-184	Rules of the Road--Western Rivers (8-1-72). FR 9-12-72, 12-28-72, 3-8-74, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 3-1-76, 6-10-76, 7-11-77, 12-6-77, 12-15-77.
• CG-190	Equipment Lists (8-1-77).
CG-191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (11-1-76). FR 3-3-77, 8-8-77, 4-9-79, 12-6-79.
CG-227	Laws Governing Marine Inspection (7-1-75).
•••• CG-239	Security of Vessels and Waterfront Facilities (5-1-74). FR 5-15-74, 5-24-74, 8-15-74, 9-5-74, 9-9-74, 12-3-74, 1-6-75, 1-29-75, 4-22-75, 7-2-75, 7-7-75, 7-24-75, 10-1-75, 10-8-75, 6-3-76, 9-27-76, 2-3-77, 3-31-77, 7-14-77, 7-28-77, 9-22-77, 9-26-77, 12-19-77, 1-6-78, 1-16-78, 3-2-78, 11-16-78, 1-22-79, 1-25-79, 2-12-79, 11-5-79, 12-10-79, 1-31-80.
CG-242	International Conventions & Conferences on Marine Safety (6-51).
• CG-257	Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-77). Ch-1, 3-17-78. FR 9-26-77, 10-10-78, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79.
CG-258	Rules and Regulations for Uninspected Vessels (4-77). Ch-1, 3-17-78. FR 6-14-79, 7-2-79, 12-17-79.
CG-259	Electrical Engineering Regulations (7-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78.
CG-268	Rules and Regulations for Manning of Vessels (7-1-77). FR 11-19-79.
CG-293	Miscellaneous Electrical Equipment List (6-73).
CG-323	Rules and Regulations for Small Passenger Vessels (7-1-77). Ch-1 3-17-78. FR 10-25-77, 7-17-78, 3-12-79, 6-14-79, 7-2-79, 12-13-79.
CG-329	Fire Fighting Manual for Tank Vessels (1-1-74).
CG-388	Chemical Data Guide for Bulk Shipment by Water (1976).
CG-403	Great Lakes Pilotage Regulations (7-76).
CG-439	Bridge to Bridge Radiotelephone Communications (12-1-72). FR 12-28-72, 3-8-74, 5-5-75, 7-11-77.
CG-467	Specimen Examinations for Uninspected Towing Vessel Operators (10-1-74).
CG-474	When You Enter That Cargo Tank (3-76).
CG-478	Liquefied Natural Gas, Views and Practices, Policy and Safety (2-76).
CG-480	Oil Pollution Control for Tankermen (6-75).
CG-482	Benzene Safe Handling Practices (12-76).
CG-486	Shippers Guide to Hazardous Materials Regulations (Water Mode) (9-77).
CG-491	Safety for Small Passenger Vessels (8-77).
OLD CG-497,	Rules and Regulations for Recreational Boating (12-78), now M 16752.2 (12-78) FR 7-19-79.
••• CG-515	Rules and Regulations for Foreign Vessels Operating in the Navigable Waters of the U.S. (2-78). FR 1976--7-8, 8-26, 9-16, 9-20, 12-13. 1977--1-3, 3-31, 5-19, 6-16, 7-7, 7-14, 7-21, 7-25, 8-4, 8-11, 9-8, 9-12, 9-22, 9-26, 9-29, 11-10, 12-8, 12-15, 12-19. 1978--4-6, 5-18, 5-22, 6-29, 7-24, 9-25, 11-16, 11-20, 11-30, 12-7, 12-28. 1979--1-22, 1-25, 2-5, 2-12, 2-26, 3-29, 4-12, 4-16, 5-3, 5-7, 5-31, 6-14, 8-2, 8-16, 8-27, 9-4, 9-24, 10-15, 10-18, 11-1, 11-5, 11-19, 12-3, 12-10, 12-27. 1980--1-10, 1-31.
CG-518	Marine Investigating Officer's Regulations Handbook (2-78). FR 2-16-78, 4-27-78, 5-25-78, 6-15-78, 9-25-78, 10-19-78, 11-20-78, 1-25-79, 7-19-79, 9-4-79, 1-10-80.
CG-526	Utilizing the Packaged Hazardous Materials Regulations, 49 CFR (5-78).
Safety of Life at Sea: Convention, with Regulations, London, June 17, 1960.	
Specifications for Merchant Vessel Equipment (Subparts of Chapter Q, 46 CFR, parts 160 to 164.	

•Temporarily out of stock
••Under revision--CG-176 text can be found in Title 46 CFR Parts 41-69
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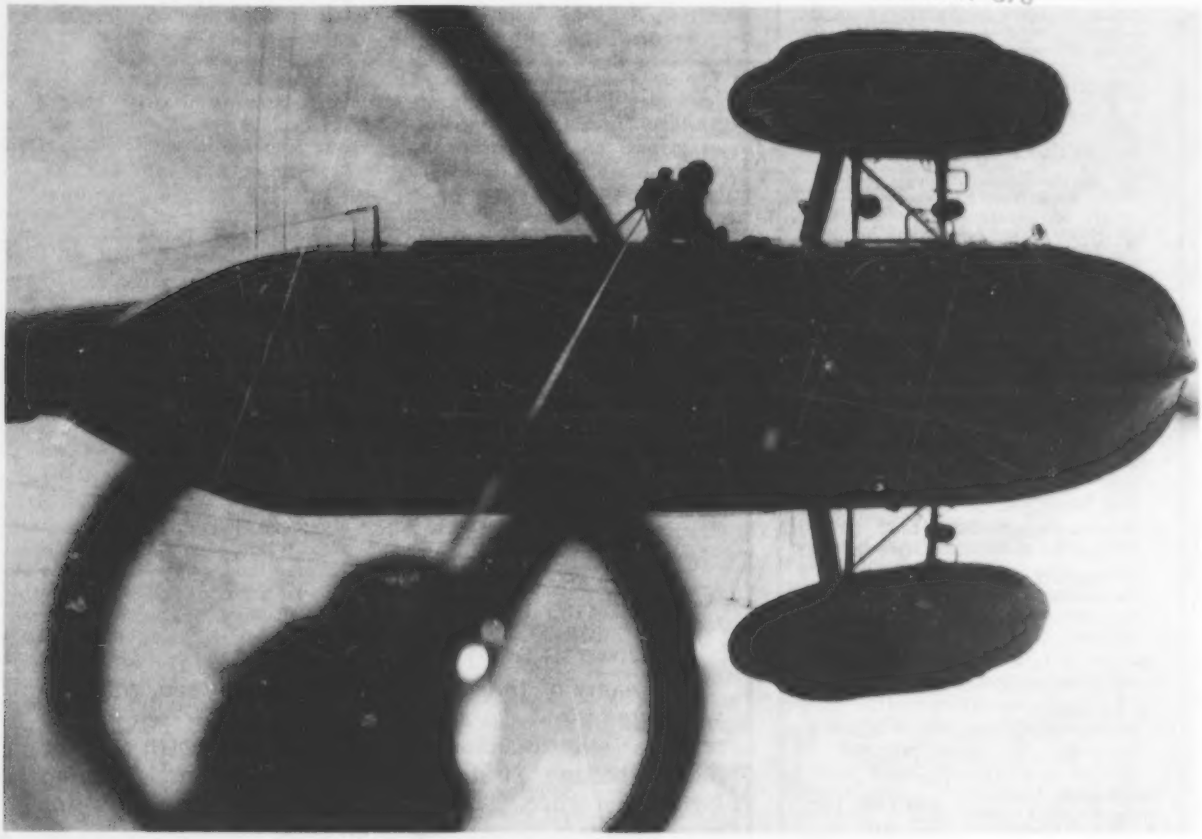

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Commandant

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cover

To many of the victims of disaster at sea, this is a welcomed view. In a new Coast Guard air-sea rescue program, physicians of the U.S. Public Health Service learn through first-hand experience that dangling beneath a roaring helicopter can be traumatic for some patients. Story begins on page 86.

maritime sidelights

CG ISSUES WARNING AGAINST UNAUTHORIZED LIFERAFT SERVICING

The Coast Guard is urging both foreign and U.S. vessel operators, ship masters and port agents to select proper servicing facilities for their inflatable liferafts.

Coast Guard officials have received several reports of improperly serviced rafts that would have malfunctioned in an emergency. The problems usually were traced to servicing by firms that are not trained or authorized by the raft manufacturers to perform the required maintenance.

Servicing of rafts ashore should be limited to facilities and depots recommended by the raft manufacturer because different types of rafts require different replacement parts and packing procedures. Unless rafts are overhauled and recertified by authorized firms, mistakes in packing can occur. Manufacturers waive responsibility for the operation of their rafts unless they are serviced by authorized stations.

Facilities designated as "U.S. Coast Guard Approved" are not necessarily qualified to work on all types of liferafts. Such approvals apply to servicing specific raft designs. Therefore, those sending rafts ashore for servicing should check the manufacturer's list of qualified facilities. In the case of U.S. flag inspected vessels, rafts must be serviced at Coast Guard approved facilities.

1981 OIL SPILL CONFERENCE

The seventh biennial Conference on the Prevention, Behavior, Control and Cleanup of Oil Spills will be held on March 2-5, 1981, at the Atlanta Hilton, Atlanta, Georgia. More than 1,500 delegates and exhibitors from all over the world are expected to attend. Sponsors of the international conference are the American Petroleum Institute, the U.S. Environmental Protection Agency, and the U.S. Coast Guard.

Technical, scientific, and socio-economic-legal papers for presentation at the conference are invited. The 115 papers selected will be chosen from abstracts submitted by June 2, 1980. These abstracts must be in English, 200 to 250 words, and information being reported on must not be already described in any other open technical or scientific publication. Authors will be notified of selection by July 28, 1980.

The conference will stress spill prevention, development of new techniques for use in inland, coastal, deepwater and Arctic oil spill control operations, and spill liability and damage assessment. Papers are particularly sought in clean-up operations, cooperatives, training techniques, monitoring, new prevention and control techniques, new equipment developments, case histories of specific spills, oil transfer practices, offshore platform operations, deepwater port operations, dispersants, fate and effects of oil, natural resource damage assessment, and national and international socio-economic-legal aspects.

Submit abstracts **no later than June 2, 1980** to:

CDR Ted Leigh (G-DMT/54)
U.S. Coast Guard Headquarters
Washington, DC 20593
(202) 426-2700

CONFERENCE ON CONTROL OF HAZ MAT SPILLS

This year's Conference and Exhibition on Control of Hazardous Material Spills is being held May 13-15, 1980 at the Galt House Hotel, Louisville, Kentucky. The conference is sponsored by the U.S. Environmental Protection Agency, U.S. Coast Guard, and Vanderbilt University.

The conference will feature a discussion panel comprised of special guests who will discuss issues and progress in the area of hazardous chemical emergencies. Also, a comprehensive show consisting of approximately 50 exhibitors will feature the latest advances in both equipment and services. A film festival will complement the conference by illustrating the many aspects of hazardous materials spills presented at the technical sessions and exhibition. Altogether, more than 100 technical papers, exhibits, films and feature programs will be presented.

For additional information. write or call:

Hazardous Materials Conference Coordinator
Center for Environmental Quality Management
Box 6067, Station B
Nashville, TN 37235
(615) 322-2331

NEWS ON HYPOTHERMIA DEATHS

Victims of exposure or cold water drowning should be thoroughly warmed before being declared dead, claimed medical experts at a recent International Conference on Hypothermia.

Cold puts these victims into a "metabolic icebox" in which body processes are slowed down. "Because of this slow down, there is a better chance that victims can survive drastic drops in their internal body temperature. We are finding, in particular, that cold water drowning victims submerged for up to 30 minutes have been revived without brain damage," explained Neil W. Ross, conference chairman and marine recreation specialist with the University of Rhode Island Sea Grant Marine Advisory Service.

Ross and over 200 people from five nations gathered at URI recently for the first meeting held to examine what is currently known about hypothermia and its treatment. Meeting sponsors included URI, the American National Red Cross, the Sea Grant Program, the U.S. Coast Guard, and the Undersea Medical Society.

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MARITIME SIDELIGHTS.....

Hypothermia is the internal cooling of the body caused by exposure to cold air or water. Lowering of this temperature to the 70's can result in death. Hypothermia has caused deaths for centuries and almost everyone has at one time suffered from at least a mild case. Recognition of hypothermia as a leading cause in cold water drownings, and as a contributor to deaths among the elderly and children, has recently received national attention.

"Current research into hypothermia, particularly into its role in cold water drownings, has pointed out that many of the former rules about treatment of hypothermic victims need to be changed. This conference began the development of standardized treatment techniques based on these new discoveries of the body's reaction to cold," Ross said.

The conference produced some general guidelines for the public to follow in recognizing and treating hypothermia. To determine how hypothermic a victim is, experts recommend relying upon observations of the victim's behavior, and the administration of simple tests. Thermometers are not reliable because those in use only measure down to 94 degrees and reflect surface body temperature rather than the critical internal body temperature.

Mild hypothermia victims with internal body temperatures above 90 degrees F. will still be able to think clearly despite feeling extremely cold or shivering violently.

If the victim is stumbling, appears drunk and cannot answer simple questions or count backwards, it is likely that profound hypothermia has set in and the body core has cooled below 90 degrees F.

For mild hypothermia victims, the recommended treatment is to insulate the victims from the cold. A warm drink, while not adding greatly to increasing the internal body temperature, can still make the victim begin to feel warmer while the body is recovering.

In severe hypothermia, victims are unable to defend themselves from the cold and someone else must take charge. The person should be insulated or moved out of the cold environment and gentle heating, such as trunk to trunk body rewarming or hot water bottles, can be applied to stop further cooling. "You can bring on heart attacks if the victim is excessively jarred so great care should be taken in transporting or moving the victim," Ross explained.

Treatment should not be stopped once a victim begins to "feel warm." Since skin temperatures rise more quickly than internal temperatures, the victim will start feeling better before the elevation of the core temperature. It is essential, therefore, to keep the victim under observation to ensure that the internal warming has happened.

If a victim is unconscious, the breathing passage should be checked to see that it is clear, and the victim's pulse should be taken. Many conference participants believe that cardiopulmonary resuscitation (CPR) should be applied only if there is no sign of a pulse. "In light of the fact that the body is in a metabolic icebox state where body processes are slowed but not stopped, the question of whether CPR is appropriate needs to be resolved in the immediate future," Ross stated.

Additional information about hypothermia and its treatment can be obtained by writing for either the technical conference proceedings or for a hypothermia handbook. Both will be available later this year from the URI Marine Advisory Service, Narragansett Bay Campus, Narragansett, RI 02882.

DOT AND CHEMTREC JOIN FORCES ON HAZ MAT EMERGENCIES

The Chemical Transportation Emergency Center (CHEMTREC) and the Department of Transportation have agreed to combine efforts to handle emergencies involving the transportation of hazardous materials. The arrangement is designed to facilitate the reporting of, and response to, such incidents.

Under the agreement, CHEMTREC will promptly notify the Coast Guard's National Response Center (NRC) when it receives information about significant incidents involving hazardous materials. NRC, in turn, will promptly inform CHEMTREC of any incident or emergency requiring information or advice available through CHEMTREC.

In announcing the agreement, Secretary of Transportation Neil Goldschmidt said the agreement "will form an unusual public-private team to provide a reporting system and data center that will be of unique value to local officials in coping with accidental chemical emergencies."

CHEMTREC, set up and run by the Chemical Manufacturers Association, is designed to provide immediate information to carriers and public safety officials facing a chemical transportation emergency. The service, which began operation in 1971, has handled more than 13,500 such emergencies--about 85 percent of those involved rail or truck transportation.

The NRC was established to receive notification of accidental spills of oil and certain hazardous substances. It also receives calls on other hazardous materials and pollution incidents.

(Reprinted from the American Waterways Operators, Inc. "Weekly Letter" of March 22, 1980, Volume XXXVII, No. 12.)

Aside from temporary documents, such as safety and security zones, there were few Coast Guard regulations published in the Federal Register during March. Three final rules were published. These were: CGD 79-066, COLREGS Demarcation Line, Boston Harbor (6 March 1980 Federal

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Register); CGD 73-243, Cargo Information Cards (17 March 1980); and CGD 77-103, Great Lakes Navigation Safety Regulations (24 March 1980). There were also four proposed rules published during this period. These were: CGD 75-59, Compatability of Bulk Liquid and Liquefied Gas on Vessels (17 March 1980); CGD 79-137, Start in Gear Protection Devices (24 March 1980); CGD 80-21, Heptane Ignition Test for Hand Red Flares (3 April 1980); and CGD 80-21A, Equipment Requirements for Boat Operators (3 April 1980). One supplementary rule was published, CGD 76-086A, on Combination Fire Hose Nozzles. This was published on 31 March 1980.

A supplemental notice and a notice of a seminar were published on the subject of Tank Barge Construction Standards. The supplemental notice, CGD 75-083 and 75-083A, served to notify the public that the tank barge construction regulations under the same docket number would be postponed until an independent study could be completed by the National Academy of Sciences. The seminar notice concerned a 30 May 1980 seminar to be held in room 7132, 1111 Constitution Ave. NW, Internal Revenue Service Building, Washington, DC from 9 a.m. to 5 p.m. This seminar is in relation to the Tanker Safety and Pollution Prevention (TSPP) regulations published as Part V of the 19 November 1979 Federal Register.

A notice was published on 3 April 1980, CGD 80-30, which solicited for applicants for both the Chemical Transportation Advisory Committee (CTAC) and the Rules of the Road Advisory Committee (RORAC). Interested applicants should write to the Marine Safety Council at the address listed below.

Any questions regarding regulatory dockets or companies and individuals wishing to speak at public hearings should notify Capt. P. J. Danahy (G-CMC/24), U.S. Coast Guard Headquarters, 2100 Second St. SW, Washington, DC 20593; (202)426-1477.

* * *

QUALIFICATIONS OF THE PERSON IN CHARGE OF OIL TRANSFER OPERATIONS, TANKERMAN REQUIREMENTS CGD 74-44, 74-44a

These regulations will redefine and establish qualifying criteria for the certifying of individuals engaged in the carriage and transfer of dangerous cargoes in bulk.

It has been found that most pollution incidents are the result of personnel error; consequently, the minimum qualifications of persons involved in handling polluting substances should be specified.

As stated in the last issue, these projects have been withdrawn (44 FR 25243). New notices of proposed rulemaking (NPRM's) which were anticipated in June have been delayed and are now scheduled for publication in April of this year under new Coast Guard docket numbers 79-116 and 79-116a.

REVISION OF ELECTRICAL REGULATIONS CGD 74-125

This regulation will constitute a general revision and updating of the electrical regulations to conform with latest technology. It will include steering requirements for vessels other than tank vessels.

This revision is occurring because industrial standards for electrical engineering have changed in the past few years, and the regulations must be brought up to date to reflect current industry practices.

An initial NPRM was published on 27 June, 1977 (42 FR 32700). A supplemental NPRM was published as CGD 74-125A on 3 March, 1980 (Part VII).

NEW TANK BARGE CONSTRUCTION CGD 75-083 UPGRADE OF EXISTING TANK BARGE CONSTRUCTION CGD 75-083a

This action is comprised of two regulatory projects centered on tank barge construction standards. These projects were the result of a Presidential initiative of 17 March 1977, directing a study of the tank barge pollution problem. One project will address new barge construction while the other will pertain to existing barges. Regulatory documents for both will be published at the same time and joint public hearings have been held.

In July 1977, the Coast Guard began a reexamination of the tank barge construction standards. It was determined that new construction would be treated separately from existing barges. An advance notice of proposed rulemaking (ANPRM) was then issued to gather additional data and assess impacts related to existing barges.

The new NPRM on tank barge construction, withdrawing the prior NPRM and the ANPRM for existing tank barges, was published as part VI of the 14 June 1979 Federal Register (44 FR 34440 and 44 FR 34443, respectively).

Public hearings were held on the dockets as follows: 2 August 1979, Washington, DC; 15 August 1979, Seattle, WA; 23 August 1979, New Orleans, LA; 5 September 1979, Washington, DC; and 7 September 1979, St. Louis, MO. The comments given at the hearings have been incorporated in the docket.

On Thursday, 8 November 1979 a Federal Register notice extended the comment period on the project. This extension was based on the continued public interest and ran to 1 December 1979.

A Supplementary Notice was published as Part III of the 13 March 1980 Federal Register (44 FR 16438). This notice informs the public of a deferment in the rulemaking process for these dockets. The comments received have raised significant questions concerning these proposals. It was decided that the entire tank barge pollution problem warranted a carefully considered study by a recognized independent body. The National Academy of Sciences/-National Research Council will conduct the study. As part of the study a two day workshop will be held on 15 and 16 April 1980. The study will be completed by the end of January 1981. The Coast Guard will defer any further rulemaking on these proposals until completion of the study and the dates in the proposals of 14 June 1979 are no

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longer valid. If the Coast Guard should pursue further action on these proposals, a new time table will have to be developed.

Anyone wishing to obtain copies of the rulemaking may do so by contacting Capt. P. J. Danahy, Marine Safety Council (address is given in the introduction to the Keynotes section).

POLLUTION PREVENTION, VESSELS AND OIL TRANSFER REGULATIONS CGD 75-124a

This regulation would reduce accidental or intentional discharge of oil or oily wastes during vessel operations.

The basis of this regulation is threefold. First, there is the need to reduce the number and incidence of oil spills. Second, this regulation will help to clarify the existing rules. Finally, this regulation covers the additional requirement for oil-water separators under the 1973 International Convention for the Prevention of Pollution from Ships.

An NPRM was published on 27 June 1977 (42 FR 32670) and a supplemental NPRM was published 27 October 1977 (42 FR 56625). Due to substantive changes in the regulation, a new NPRM is scheduled for April 1980.

The following three regulations, CGD 77-057, CGD 77-058(b)(c)(d), and CGD 77-063, make up the Tanker Safety and Pollution Prevention (TSPP) Regulations. Public hearings have been held on the package, comments were requested and 541 have been received. A notice of delay in publishing the final regulations was published in the 7 June 1979 Federal Register (43 FR 32713). Final rules have been published and appeared in the 19 November 1979 Federal Register (44 FR 66500). Currently a tanker seminar on construction standards has been scheduled for 30 May 1980 from 9 a.m. to 5 p.m. in room 7132, 1111 Constitution Ave. NW, Internal Revenue Service Building, Washington, DC. This notice appeared in the 3 April 1980 Federal Register and further information can be received by writing Mr. Joseph Angelo, U.S. Coast Guard (G-MMT-1/13), Washington, DC 20593.

INERT GAS SYSTEM CGD 77-057

This regulation would require certain oil tankers of 20,000 deadweight tons and over to be fitted with inert gas systems.

As part of the President's initiatives to reduce marine pollution, this regulation will reduce the possibility of in-tank explosions which have been the cause of some pollution incidents.

The Inflationary Impact Statement for this regulation was completed in May 1977. An NPRM was published 12 February 1979 (44 FR 8984). Hearings were held 21 March 1979 in Washington, DC and 28 March 1979 in San Francisco, CA; 136 comments were received, have been evaluated, and the final rule has been published.

SEGREGATED BALLAST AND TANK CLEANING REGULATIONS GCD 77-058(b), (c) and (d)

This four-part regulation was initiated when President Carter directed the Secretary of Transportation to issue new rules for oil tanker standards, which were to include segregated ballast on all tankers and double bottoms on all new tankers which call at American ports. The provisions of these proposed regulations have been changed by the February 1978 Intergovernmental Maritime Consultative Organization (IMCO) Conference to include Crude Oil Washing (COW) and Clean Ballast Tanks (CBT).

The NPRM was published 16 May 1977 (42 FR 24868). As a result of the IMCO Tanker and Pollution Prevention Conference of February 1978, a new NPRM was issued on 12 February 1979 (44 FR 8984). Public hearings were then held in March in Washington, DC and San Francisco, CA; 265 comments were received on the docket, and were analyzed and the final rules were formulated. These rules appeared in the Federal Register of 19 November 1979.

STEERING GEAR DESIGN STANDARDS TO PROVIDE REDUNDANCY CGD 77-063

As part of the President's initiatives to reduce pollution, this regulation is needed to help reduce the possibility of a marine collision due to a loss of steering.

An NPRM was published 16 May 1977 (42 FR 24869). As a result of the IMCO Tanker Safety and Pollution Prevention Conference of February 1978, a new NPRM was issued on 12 February 1979 (44 FR 8984). Public hearings were held on the docket and 138 comments have been received and analyzed and the final rules have been published.

CONSTRUCTION AND EQUIPMENT EXISTING SELF-PROPELLED VESSELS CARRYING BULK LIQUEFIED GASES CGD 77-069

These regulations would amend the current ones to include the substantive requirements of the "Code for Existing Ships Carrying Liquefied Gases in Bulk," adopted by the Intergovernmental Maritime Consultative Organization (IMCO). The use of liquefied gas has increased, as have the problems associated with it. Due to its unique properties and the dangers associated with them, new regulations are being drafted. The environmental impact statement and regulatory analysis were completed in February 1979 and an ANPRM on these regulations is anticipated in December 1980.

LICENSING OF PILOTS CGD 77-084

This regulation takes into account the problems caused by increased ship size and unusual maneuvering characteristics. The proposal would require recency of service for each route upon which a pilot is authorized to serve, licensing with tonnage limitations

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commensurate with pilot experience, and consideration of ship-handling simulator training for pilots of very large vessels. A regulatory analysis and work plan were completed in October 1978. An NPRM is expected in April 1980.

REVISION OF 46 CFR 157.20-5 DIVISION INTO THREE WATCH REGULATION CGD 78-037

This revision would have required an adjustment in vessel manning requirements, to bring them in line with current legislation. It would change the requirements which identify personnel who must be used on the three watches and personnel who may be employed in a day working status. An NPRM formerly scheduled to be published on this docket in January 1980 will not be published, as the docket has been withdrawn.

TANK VESSEL OPERATIONS REGULATIONS, PUGET SOUND CGD 78-041

This regulation governs the operation of tank vessels in the Puget Sound area. It was initiated to reduce the possibility of environmental harm resulting from oil spills in Puget Sound. This is to be accomplished by governing the operation of tankers and reducing the risk of collision or grounding.

Former Secretary of Transportation Brock Adams signed a 180-day Interim Rule on 14 March 1978 prohibiting entry of oil tankers in excess of 125,000 deadweight tons in Puget Sound; this appeared in the Federal Register of 23 March 1978 (43 FR 12257). An ANPRM was published 27 March 1978 (43 FR 12840). An extension of the interim rule was published in the Federal Register in order to allow the Coast Guard adequate time to complete this rulemaking.

The public hearings scheduled 11 and 12 June in Seattle, Washington, 13 June in Mt. Vernon, Washington, and 14 June in Port Angeles, Washington have been completed and all the comments received have been entered in the docket files for consideration. The extension of the interim navigation rule was published 21 June 1979 (44 FR 36174). This extension was effective 1 July and will be in effect until the Coast Guard prints notice of its cancellation. Copies of documents or the transcripts of the hearings may be obtained by writing to the Marine Safety Council. A final rule on the docket is currently expected in July 1980.

EIGHT-HOUR DAY VOLUNTARY OVERTIME CGD 78-146

This docket is a review of the Eight Hour Day, Voluntary Overtime regulation in 46 CFR 157.20-10, which states that no licensed officer should be required to be on duty more than eight hours per day except in extraordinary circumstances. Existing regulations, however, do not address overtime or consider any possible "fatigue factor." Recent Coast Guard studies have shown that this factor has a profound effect on reaction time and judgement, therefore the regulatory project has been withdrawn.

PERSONNEL JOB SAFETY REQUIREMENTS FOR FIXED INSTALLATIONS ON THE OUTER CONTINENTAL SHELF CGD 79-077

This regulation is concerned with the health and safety requirements for installations engaged in oil field exploration and development. This action was mandated by pending Outer Continental Shelf legislation. It will provide more comprehensive protection for personnel employed in vessels and installations in the oil trade. The work plan received by the Marine Safety Council (MSC) in early July calls for an NPRM in March 1980.

SHIPBOARD NOISE ABATEMENT STANDARDS CGD 79-134

These standards will establish acceptable sound levels for each of the various vessel compartments based on the latest technology. The standards will differentiate acceptable sound levels for both existing vessels and new vessels, acceptable methods of compliance, and will establish a hearing conservation program.

During the development of these standards, the U.S. Naval Ocean Systems Center (NOSC), San Diego, California was contracted by the Coast Guard to evaluate sound levels aboard several U.S. merchant vessels, to study the data obtained, and then to define the extent of the noise problem. Based on this data and other information available, they were asked to recommend a set of noise levels to be used in the control and/or elimination of the shipboard noise problem for the proposed standards.

This study has been completed. Copies are available through the National Technical Information Service (NTIS), Springfield, Virginia 22161; request NOSC technical documents numbers 243, 254, 257, 267 and 405.

PERSONNEL AND MANNING STANDARDS FOR FOREIGN VESSELS CGD 79-081

This regulation, deemed necessary to reduce the probability of oil spills, would establish minimum manning levels for foreign tank vessels operating in U.S. navigable waters. It would also establish procedures for the verification of training, qualification and watchkeeping standards. As we go to press, an NPRM is pending.

PERSONNEL SAFETY AND HEALTH REQUIREMENTS FOR INDUSTRIAL VESSELS CGD 80-15

Similar to 79-077, this regulation covers the vessels engaged in exploration, supply and support on the Outer Continental Shelf (OCS). Mandated by pending OCS legislation, this project covers the growing fleet of vessels which perform the variety of industrial functions involved in the exploration and development of offshore resources. The regulations, designed to provide a more comprehensive personnel protection, are scheduled

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CG-478

LNG and LPG — Views and Practices, Policy and Safety

By
Doctor Alan L. Schneider
Lieutenant Gary L. Gregory
Lieutenant John S. Sedlak

The following article consists of excerpts from the Coast Guard publication "Liquefied Natural Gas and Liquefied Petroleum Gas, Views and Practices, Policy and Safety" (CG-478), which was recently revised to present current U.S. Coast Guard views, practices and policies for the transportation by water of Liquefied Natural Gas (LNG) and Liquefied Petroleum Gas (LPG). This publication answers a number of questions frequently asked by those interested in water transportation of these important bulk cargoes. It covers the properties and hazards of LNG and LPG, LNG and LPG carriers, operational controls and facilities, and personnel training and qualifications, and includes a question and answer section and recommendations for selected readings in the event a more thorough and technical knowledge of LNG and LPG is desired.

CG-478 will be reviewed periodically and revised editions will be published as necessary to assure that the information is current. Comments and recommendations are solicited and should be sent to the Chief, Cargo and Hazardous Materials Division (G-MHM/TP14), U.S. Coast Guard Headquarters, Washington, DC 20593. Single copies of this publication are available to the public free of charge from the same address.

Of all the chemicals being shipped in United States waters today probably none has captured the attention of a large portion of the American public as much as Liquefied Natural Gas (LNG) and Liquefied Petroleum Gas (LPG). Yet LNG and LPG are only two of the many bulk hazardous commodities transported by water, and many other commodities exhibit as great or even greater hazards. There is nothing exotic about the chemicals making up LNG and LPG--they are the lower molecular weight portions of the hydrocarbon spectrum, just as fuel oil is part of the higher molecular weight portion. Part of the problem may be that LNG, and to a lesser extent, LPG, are relatively new to the American public. Generally speaking, the hazards of LNG and LPG are not well understood by the public, nor are these hazards usually put into perspective with the hazards from other, more common dangerous materials such as gasoline.

Public concern is understandable--and commendable. The Coast Guard, however, has had many years of experience with hazardous cargoes. Supported by extensive research, the Coast Guard has developed a group of regulations covering vessel design and operations, shoreside facility design and operations, and

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rsonnel training and qualifications. CG-478 provides understanding of the Coast Guard's role in zardous materials transportation in general and LNG d LPG transportation in particular, and thus may lp to allay public concern.

STORY

Although both LNG and LPG have been produced r many years, large-scale importation into the ited States is a recent factor in American energy pply. With the depletion of continental United ates petroleum reserves, and the need for LNG and G markets by overseas producers, there is a place r both LNG and LPG in the United States. Both NG and LPG represent energy that is often wasted, ergy that must be utilized in an energy-short world.

The Coast Guard began studying LNG in the late 60's and soon thereafter expanded these studies to clude LPG. At the same time, the transport of bulk emicals in large portable containers and portable nks emerged as a problem requiring an increased fort both domestically and internationally. Recog-zing this problem, the Coast Guard asked the Inter-overnmental Maritime Consultative Organization MCO) to study this form of transport.

Based on Coast Guard leadership in the classifica-on of hazardous substances and the development of s related construction program, IMCO, on ctober 12, 1971, adopted a code for the construction nd equipment of bulk chemical carriers which was milar to U.S. national regulations. This was followed y the IMCO Code for the Construction and Equipment Ships Carrying Liquefied Gases in Bulk, adopted ternationally on November 12, 1975. Additional ternational agreements promoting marine safety, cluding the Tanker Safety and Pollution Prevention onvention and the Standards for Training, Certifica-on and Watchkeeping for Seafarers, 1978, were eveloped in later years.

IMCO's work provided the foundation for a set of .S. regulations applicable to liquefied gases. This egulatory effort, plus that of the Research and evelopment Program, has resulted in an understand-ng of the properties and hazards of LNG and LPG, and trict standards regulating vessel design and construc-ion, vessel operational controls and shoreside acilities, and ship and shore personnel training and ualifications. Once a large quantity of either cargo released, there is not much that can be done to itigate the effects of a spill. This fact underlies the hilosophy of the Coast Guard's LNG and LPG regula-ons: *large-scale cargo releases must be prevented.*

NG AND LPG PROPERTIES AND HAZARDS

As with all hazardous materials, a good under-anding of the properties and behavior of LNG and PG is necessary to assure that design, construction, d operation of vessels and facilities are adequate to otect lives, property, and the environment during ter transportation. Although these are two of the ore hazardous cargoes, they are not unique nor are ey the most hazardous.

A number of aspects of LNG and LPG behavior have been studied, including land spills, water spills, vapor clouds, rollover, reactivity, and the effects of very cold temperatures. In addition, much relevant knowledge has been gained from years of experience in the transportation of these and other liquefied flammable gases. Their primary hazard is flammability, although other hazards have been identified and investigated.

The components of LNG and LPG are known to be stable and not subject to violent chemical reactions in the absence of oxygen. The primary concern is with the behavior of large releases resulting from major accidents such as high energy ship collisions. Both LNG and LPG are transported in bulk as liquids to reduce the required container volume. In practice, LNG is carried at low temperature near atmospheric pressure in the marine mode; LPG is usually carried in bulk at low temperatures in ships and at high pressures in barges.

Safety in the transportation of all hazardous materials begins with a thorough understanding of the properties and behavior of the materials involved and an analysis of the risks involved in each step of the transportation system to determine the proper preventive measures. For both LNG and LPG, a sizable body of knowledge exists to ensure that containment systems on vessels and facilities present minimal danger under normal operating conditions. The primary preventive measures are good vessel design, stringent operational controls, and proper personnel training.

CARRIER DESIGN AND CONSTRUCTION

The Coast Guard is responsible for the safety of all U.S. flag liquefied gas ships world wide and all foreign flag liquefied gas ships while in U.S. waters. The statutory authority for the regulation of liquefied gas ships is the United States Code, specifically the Port and Tanker Safety Act of 1978 (46 USC 391a). This responsibility has led to the development of standards for ship design, construction, alteration, repair, maintenance, and operation.

The bulk shipment of LNG and LPG presents potentially significant hazards; the extreme flammability and the very low temperatures present major problems in ensuring that these cargoes are transported safely. This necessarily means that the cargo must not escape from the tank. Ship design regulations are intended to prevent any cargo release whenever possible, and to minimize the quantity released when prevention is not possible. Also, tank failures during normal operations are to be prevented. This has led to development of tank designs that have built-in redundancy; tanks that will leak before they fail, that is, in which any crack due to normal operations will give ample warning before catastrophic failure; or tanks that, through conservative design, can be shown not to fail in ordinary service. Many types of cargo systems are acceptable as long as the level of safety is at or above the existing required level. This equivalent level of safety concept is followed throughout the vessel design regulations. Since it is not

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possible to design a ship capable of withstanding the most serious collisions and groundings without some damage to the cargo containment system, operational controls such as restricting other vessels from approaching an LNG or LPG carrier in inland waters serve to prevent a major collision.

Before any U.S. flag vessel operates anywhere in the world, it must undergo a certification procedure to ensure that it meets all applicable design and construction requirements. Both U.S. and foreign flag vessels must meet essentially the same requirements for the cargo containment portion of the vessel. U.S. flag vessels are reviewed by the Coast Guard for compliance in such areas external to the cargo containment system as the design and construction of propulsion and steering equipment, auxiliary systems, accommodations arrangements, lifesaving equipment, and electrical systems, as mandated in 46 CFR 30-40. Foreign flag vessels are required to meet similar requirements which are found in the Safety of Life at Sea (SOLAS) Convention. Both a review of the ship's plans and a complete inspection are needed before a U.S. flag vessel is certificated and allowed to carry

". . . LNG and LPG are only two of the many bulk hazardous commodities transported by water, and many other commodities exhibit as great or even greater hazards."

cargo. Thereafter, biennial inspections are required to maintain a valid Certificate of Inspection. For foreign flag vessels, a Letter of Compliance (LOC) is required. Biennial examination of foreign flag vessels is necessary for the renewal of an LOC. Additionally, expiration of a vessel's IMCO Certificate of Fitness, changes of vessel ownership, or changes of vessel registry invalidate the Letter of Compliance; the latter two circumstances must be reported to the Coast Guard. Although they do not automatically result in invalidation of the LOC, damage, repairs, or modifications to the cargo containment system must also be reported to the Coast Guard.

The basic regulatory requirements for the design, construction, and testing of liquefied gas ships are contained in 46 CFR 154; additional requirements are found in various other subchapters under 46 CFR addressing marine safety. The Coast Guard regulations parallel the recommendations of the IMCO Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, except that they are more stringent concerning allowable stress levels, crack arresting steels, lower ambient temperatures, and cargo temperature/pressure controls. For both U.S. and foreign flag carriers, the Coast Guard is concerned with the design and arrangement of cargo tanks and cargo piping and vent systems; the arrangement and adequacy of installed fire extinguishing systems and equipment, and structural fire protection; safety systems designed to give warning of leaks or other disorders which could result in a casualty; compatibility of the cargo with materials of construction; hull steel; cargo pressure and temperature control; segregation of the cargo spaces from the machinery working spaces and accommodation spaces; and the suitability of electrical equipment installed in hazardous areas.

In addition, IMCO has developed standards for existing liquefied gas carriers. The Coast Guard intends to implement elements of the IMCO Existing Ships Code that exceed current United States requirements, and has established a task group to draft the regulations. This intent has been published as an Advance Notice of Proposed Rulemaking entitled "Construction and Equipment of Existing Self-Propelled Vessels Carrying Bulk Liquefied Gases," Federal Register, Volume 42, Number 126, 30 June 1977.

FACILITIES AND OPERATIONAL CONTROLS

The Coast Guard has statutory authority to regulate and control port safety and security related matters. Presently, all bulk liquid and bulk liquefied gas facilities are regulated under the provisions of 33 CFR 126. These regulations, originally written in the 1960's, are being rewritten to reflect the vast changes in chemical transportation technology. The Coast Guard's Waterfront Facilities Task Force is revising, expanding, and developing Coast Guard waterfront facility regulations. Among these new regulations are comprehensive LNG facility rules; LPG facility rules will follow later. These rules were published as an Advance Notice of Proposed Rulemaking in August 1978. It is anticipated that final regulations will be published in 1980.

Under the authority of the Natural Gas Pipeline Safety Act, the Office of Pipeline Safety Regulation (OPSR) of the Materials Transportation Bureau has also prepared regulations for LNG facilities. In order to eliminate possible LNG water front facility regulation overlap and conflict, and to assist the owners and operators of LNG facilities subject to both Coast Guard and OPSR regulations, a Memorandum of Understanding was signed by the two agencies. Under the Memorandum of Understanding, the Coast Guard is responsible for establishing regulatory requirements for facility site selection as it relates to management

"Generally speaking, the hazards of LNG and LPG are not well understood by the public, nor . . . put into perspective with the hazards from other, more common dangerous materials such as gasoline."

of vessel traffic in and around the facility; fire prevention and fire protection equipment, systems and methods for use at a facility; facility security; and all other matters pertaining to the facility between the vessel and the last manifold (or valve) immediately before the receiving tank(s).

Continued on next page.....

OPERATIONS PLANS

The local COTP establishes the need for special operating constraints for LNG and LPG vessels utilizing facilities in his area. He may require additional safety measures to be taken by the operators of LNG and LPG vessels and waterfront facilities as presented in local LNG/LPG Operations Plans.

In conjunction with the LNG/LPG Operations Plan, the COTP will develop an LNG/LPG Emergency Contingency Plan for the port area. The plan will provide for a coordinated approach to an LNG or an LPG emergency. Preplanning with the maritime industry and with other federal, state, and local agencies will result in a comprehensive response organization with a complement of materials, equipment, and training needed to deal with such emergencies.

"For both LNG and LPG, a sizable body of knowledge exists to ensure that containment systems on vessels and facilities present minimal danger under normal operating conditions."

To date, no serious marine mode LNG incidents have been reported by Coast Guard Captains of the Port. Casualties from LPG incidents have been few. Furthermore, there has been no environmental damage from the release of LNG or LPG while being transported in the marine mode. Through the development of comprehensive waterfront facility regulations and operations plans, it is expected that this safety record will be maintained.

PERSONNEL TRAINING AND QUALIFICATIONS

The Coast Guard's traditional responsibility of protecting lives and property at sea and the recent additional responsibility for the protection of the environment include the establishment of qualifications for licensing and certification of merchant marine personnel serving aboard U.S. merchant vessels. The general areas of training include firefighting, cargo hazards, cargo handling systems, and procedures pertaining to the carriage of LNG.

Although the United States pioneered LNG and LPG technology, most shipping experience has been gained by foreign flag vessels on voyages not subject to Coast Guard jurisdiction. In the United States there has been a greater emphasis on crew training by formal schooling than by on-the-job training, as practiced in most cases by foreign flag crews. Nevertheless, the U.S. Coast Guard determined that standards for manning and personnel qualification for U.S. flag LNG and LPG vessels will be applied to foreign flag LNG and LPG vessels operating in U.S. waters.

Present personnel qualification standards require that the Master, Chief Mate, Chief Engineer, and First Assistant Engineer have satisfactorily completed a course of instruction in the carriage and transfer of liquefied gases as well as firefighting. A company initiated letter indicating the completion of a flag administration approved training course will serve as evidence of this training. The qualification standards require that all officers and ratings with specific duties involving cargo and cargo equipment complete a course of instruction, or onboard training, reflecting the duties performed. All crew members must also have training or onboard instruction in the special hazards of LNG and LPG, and an awareness of the general safety features of the vessel.

Presently, for U.S. crewmen intending to serve on LNG vessels, courses of instruction at the Harry Lundeberg School of Seamanship, the Calhoon MEBA Engineering School, and the Marine Institute of Technology & Graduate Studies are accepted by the Coast Guard on an interim basis, pending the formalization of appropriate regulations.

Coast Guard Captains of the Port evaluate the certification and training received by officers and crews of foreign flag LNG and LPG vessels using the IMCO Conference on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, Regulation V/3 and Resolution 12, as a measure of equivalency to U.S. standards.

Coast Guard regulations regarding LNG and LPG facility personnel requirements are contained in 33 CFR Part 126. Definite training and qualification requirements are not given in these regulations. It is, however, specified that the "person in charge" of the shoreside transfer operation must be trained in, and capable of performing competently, the necessary operations related to the transfer of the specific cargo. While these requirements vary due to the differences in facility operations, basic training in cargo characteristics, safety measures, and firefighting are universally required.

At the present time, the draft "Tankerman" regulations are in the process of further revision and should be published as a Notice of Proposed Rulemaking by 1980, with a final rule published soon thereafter. New proposed regulations under the Natural Gas Pipeline Safety Act will include training and qualification standards for LNG and LPG facility personnel. Also, regulations are under development which will require certain training standards for all personnel working at facilities handling bulk liquefied gas cargoes.

"The primary preventive measures are good vessel design, stringent operational controls, and proper personnel training."

CONCLUSION

There must be no doubt that LNG and LPG are hazardous commodities, although not the most dangerous being shipped today. Their very low human toxicity alone makes them less dangerous than many

Continued on next page.....

commodities. It is because of the fire and explosion hazards that the Coast Guard and many others have performed extensive research studies on these materials. From these studies, some of which are continuing, the Coast Guard believes that the nature of both LNG and LPG presents an acceptable risk for transportation in maritime commerce. These fuels are essentially pollution free and are energy sources that heretofore were commonly wasted; an unjustified overemphasis on safety could deprive the United States of a very valuable energy source.

CG-478, "Liquefied Natural Gas and Liquefied Petroleum Gas, Views and Practices, Policy and Safety," is a presentation of the Coast Guard position toward LNG and LPG. Though hazardous, these two cargoes present acceptable risks to society when the precautions established by the Coast Guard are followed.

About the Authors

Lieutenant Gary L. Gregory

Lieutenant Gregory, a graduate of the University of California at Davis, was commissioned as an Ensign in the Coast Guard in January 1971. He first served aboard the USCG cutter CHASE, out of Boston; then completed a tour at the Marine Safety Office, San Francisco before being assigned as Operations Officer aboard the cutter BIBB. After one year in the Eleventh District's Office of Merchant Marine Safety, Long Beach, California, he spent several months in port safety industry training at Baltimore. Lieutenant Gregory was assigned to Coast Guard Headquarters in July 1977, where his present duties involve safety-related aspects of the Coast Guard's Port Safety and Security program, particularly program policy guidance for Captains of the Port and Marine Safety Offices.

Doctor Alan L. Schneider

Dr. Alan L. Schneider earned his Doctorate in chemical engineering in 1973 from the Massachusetts Institute of Technology. He has been working as a chemical engineer since 1974 with the Cargo and Hazardous Materials Division, Technical Support Section of the Hazard Evaluation Branch at Coast Guard Headquarters. In this field, Dr. Schneider is concerned with liquefied natural gas, fire and explosion phenomena, and computer simulation of cargo releases.

Dr. Schneider frequently contributes to the *Proceedings*. His two most recent articles were "LNG Research Overview," which appeared in the March-April 1979 issue, and "Blame it on Combustion," published in the October 1979 issue.

Lieutenant John S. Sedlak

Lieutenant Sedlak attended the U.S. Coast Guard Academy, graduating with a commission of Ensign in 1974. He served aboard the USCG cutter SHERMAN as an engineering student before receiving his present assignment at Headquarters, where he is an engineer on the Merchant Marine Technical Division staff. His primary duties include the administration of the Coast Guard's Letter of Compliance program for foreign flag liquefied gas carriers, plan review of these vessels, and approval of new concepts for liquefied gas containment system designs.

for an advanced notice of proposed rulemaking (ANPRM) in October 1980.

A complete listing of all Coast Guard proposed regulations, both "significant" and "non-significant," appeared in the Thursday, February 22, 1980 Federal Register (45 FR 13312).

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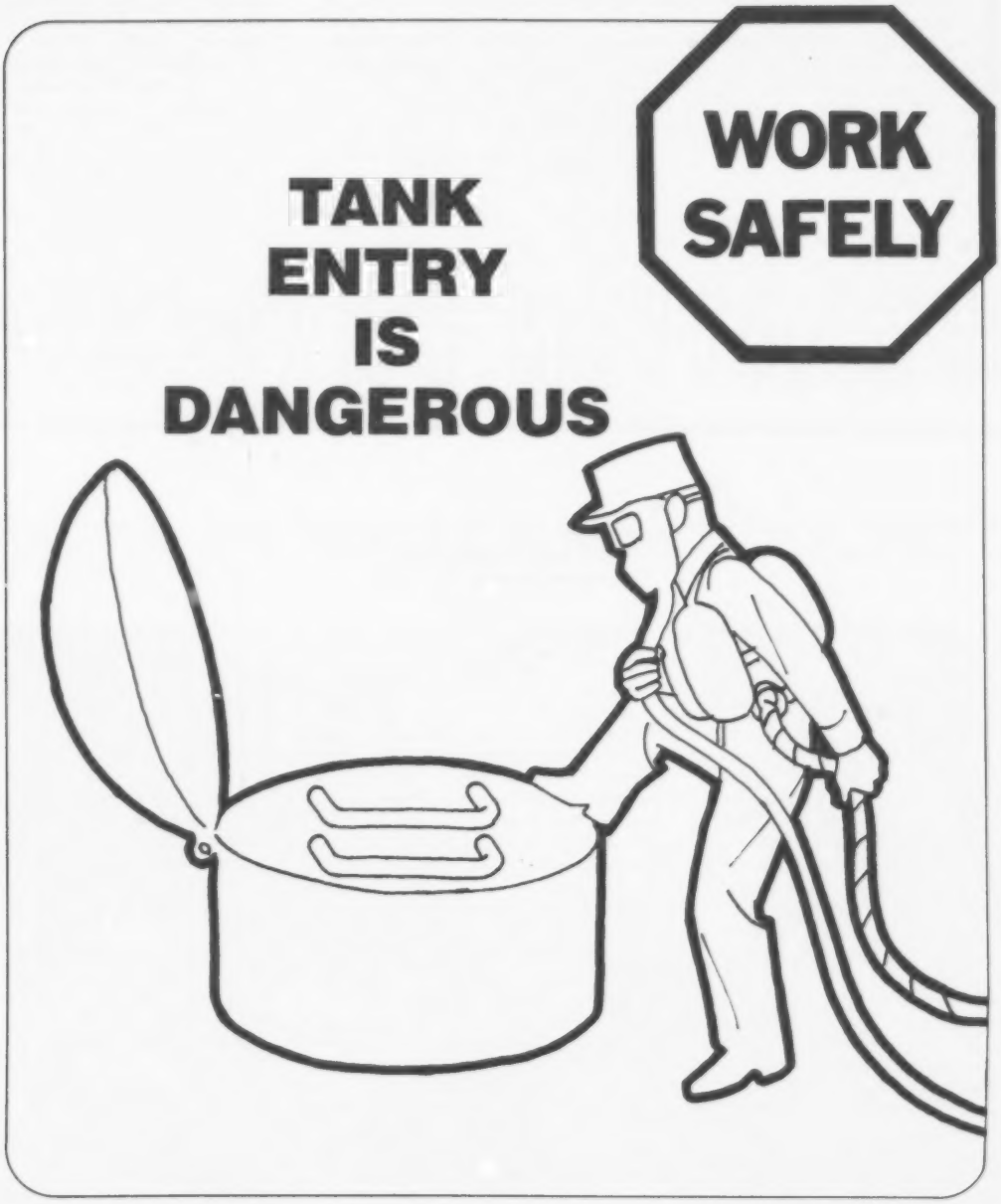

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OPERATION PHYSICIAN

By Photojournalist Jim McGranachan
Third Coast Guard District
Governors Island, New York

Doctors from the U.S. Public Health Service, Physicians Assistants and a variety of personnel from the United States Coast Guard are participating in a new program to further integrate their combined knowledge and skills. During 1978, the Coast Guard assisted in 2,295 medical evacuation cases in which Public Health Service doctors played an integral part in the decision to launch rescue operations. This caseload, along with the potential for disaster inherent in air-sea rescue operations, magnifies the intentions of the program designers.

On February 17, 1979, three U.S. Coast Guardsmen and a member of the Canadian Forces Rescue Service died when their helicopter crashed into 15-foot winter seas. They were attempting to evacuate an injured crewman aboard a Japanese fishing vessel, 180 miles southeast of Cape Cod, Massachusetts. This accident, which claimed four lives, is further evidence of the nature of the business. A rescue operation at sea is a reasonably risky venture at best.

Today, when the Coast Guard responds to the call for help, one of the Coast Guard Rescue Coordination Centers coast to coast, including Alaska and Hawaii, will assume coordination of the forces activated to conduct both land and air-sea rescues. When confronted with a medical emergency--often hundreds and sometimes thousands of miles at sea--the controllers who man these centers must rely on the medical advice of doctors from the Public Health Service when deciding if and how human resources should be committed to individual medical evacuation cases.

In June 1979, Coast Guard Headquarters issued instructions which stressed the necessity of good and meaningful communications between rescue coordinators and medical personnel during the course of medical emergencies at sea. The instruction noted that, "The U.S. Public Health Service has historically provided medical advice by radio to ships as sea. U.S. Public Health Service (USPHC) physicians have also provided advice to the Coast Guard forces. Frequently, however, USPHS personnel are unfamiliar with Coast Guard Search and Rescue (SAR) operations and with Coast Guard aircraft and vessels."

In response to these instructions, Lieutenant Stephen J. Harvey, senior controller at the Coast Guard Atlantic Area Rescue Coordination Center, Governors Island, New York, has begun to implement an orientation program he helped to design. "The intention," says Harvey, "is to familiarize doctors of the U.S. Public Health Service with air-sea rescue techniques. The method is to physically expose these physicians to the hardships and inherent dangers of rescue operations at sea. The desired result is to maximize the ability of all involved personnel to weigh the risks to the lifesavers versus the needs of a victim."

Among the first medical personnel to participate in the new program were Dr. Catherine Fitzpatrick and Dr. Daniel Kim of the U.S. Public Health Service and

Continued on next page.....

OPERATION PHYSICIAN.....

Chief Warrant Officer Ray Leyko, a Coast Guard Physician's Assistant. The three medical officers were first introduced to the intricacies of helicopter operations during a thorough briefing at the Coast Guard Air Station, Brooklyn, New York. Lieutenant Harvey then escorted the medical group to Rockaway, New York, where they boarded the Coast Guard Cutter CAPE STRAIT for some "hands on" experience.

The idea seems to have accomplished a number of objectives. Dr. Fitzpatrick explained, "Because medical evacuations often seem to run so smoothly, we doctors tend to take for granted the sheer dynamics of getting a helicopter to rendezvous with ships at sea. To evacuate patients from rolling heaving decks, often at night during the worst weather conditions, is indeed an impressive achievement. Having now shared in the experience of being lifted from the deck of a moving ship, I feel that I have greater insight, a more accurate basis from which to make operational medical recommendations."

This is exactly the reaction Lieutenant Harvey hoped to achieve when he organized the program. He noted, "The advantage of having physicians hoisted is that the rescue coordinators and the physicians will be able to communicate in the same language. There is nothing like doing a hoist yourself. Trying to maintain balance on the pitching deck of a ship, bouncing around in a dangling basket, hearing the roar of helicopter engines are all factors that a patient is exposed to during a medical evacuation. We do not want the physicians to become overcautious when considering the evacuation of a patient, but we do want the physicans to appreciate exactly what is involved in this type of operation."

As the CAPE STRAIT brought its medical passengers to a helicopter rendezvous at sea, its captain, Lieutenant Junior Grade Jeffery Huhn, acquainted his guests with his cutter. Besides receiving a taste of shipboard life,

Continued on next page.....

Lieutenant Stephen J. Harvey, senior coordinator at the U.S. Coast Guard Atlantic Area Rescue Coordination Center, Governors Island, New York, explains the intricacies of helicopter operations to Dr. Daniel Kim of the U.S. Public Health Service.

they talked in depth to members of the crew, learning about the problems and hazards they face during rescue operations.

A helicopter from Brooklyn Air Station met the CAPE STRAIT a few miles outside New York Harbor in the Atlantic Ocean. This gave the medical officers an opportunity to watch the harmony of an aircraft and a ship working closely together. More importantly, it gave them a chance to actually feel the sensations associated with being lifted from a moving ship and flying in a helicopter.

As were the others, Dr. Kim was enthusiastic about the experience. "This exercise made me aware of the forces set into motion when I make a recommendation to the Coast Guard for a medical evacuation," said Dr. Kim. "I can now visualize what actually happens out there. I have a better feel for what I am actually asking those young men to do."

When asked to summarize her thoughts about the orientation, Dr. Fitzpatrick observed, "A program like this counters the tendency for specialists to be isolated in their own areas. Participating on the open ocean in an air-sea rescue operation gave me a greater awareness of what can and can not be done on the open seas. The safety of many people can be involved when a medical evacuation is necessary. Thanks to this orientation program, I feel better equipped to make the proper decision when I am called to make an operational medical recommendation."

Dr. Fitzpatrick also commented on another aspect of the program which she appreciates.
"Working in the field with the Coast Guard," she said, "definitely left me with the feeling of being part of a proud lifesaving team."
(*Reprinted from* On Scene, *the National Maritime SAR Review, issue No. 5/6-79).*

Dr. Kim experiences first-hand the sensation of being hoisted from a moving ship to a Coast Guard helicopter. After participating in the new program, Dr. Kim and the other physicians felt better prepared to make operational medical recommendations associated with air-sea rescue operations, having learned of the methods and problems which might be encountered.

Lessons from Casualties

A mate on an uninspected towing vessel drowned after falling off the side of a tank barge while the vessel was moored at night on the Lower Mississippi River.

Preceding this accident, the tank barge had conducted crude oil offloading operations. At the time of unloading, a leak occurred at an elbow in the loading arm, which ran down the arm and dripped on the starboard (stern) deck of the tank barge inboard of the gunwale but outboard of the cargo header drip pan. A witness stated that throughout the transfer no more than one or two gallons of product leaked onto the deck. A granular absorbent material was placed on the deck area involved in order to prevent water pollution.

After the barge was moored following offloading operations, the mate was walking on the starboard side of the tank barge toward the towboat. The only illumination on the barge was from a search light on the tug, which was aimed toward shore. A splash was heard by two workers on the other side of the barge. They ran to the spot where they could hear struggling in the water. The mate was not wearing a personal flotation device; attempts to rescue him were unsuccessful.

An investigation of the area where the mate was believed to have fallen overboard indicated that it was in the vicinity of the spilled oil. In addition, there were numerous deck fittings for mooring, steam coil deck bleed-off valves, and the loading and unloading header.

This casualty points out the importance for adequate deck illumination, the necessity to thoroughly clean up oil spilled on deck, and the need for a company policy requiring employees to wear lifesaving devices whenever working over or near the water.

Nautical Queries

The following items are examples of questions included in the Third Assistant Engineer through Chief Engineer examinations and the Third Mate through Master examinations.

DECK

(1) Which of the following are the only magnetic compass correctors that correct for both permanent and induced effects of magnetism?

A. Quadrantal spheres
B. Heeling magnets
C. Athwartship magnets
D. Fore - and - Aft magnets

REFERENCE: H.O. 226, Handbook of Magnetic Compass Adjustment

(2) The precession of the equinoxes occurs in a

A. easterly direction.
B. westerly direction.
C. northerly direction.
D. southerly direction.

REFERENCE: Bowditch

(3) The difference between local apparent time (LAT) and local mean time (LMT) is indicated by the

A. equation of time.
B. difference of longitude between the local and central meridian in time units.
C. longitude in time units.
D. zone description.

REFERENCE: Bowditch

(4) A claim for cargo damages may be held against the shipowner if such damage is the result of failure of the ship's officer to

A. ensure the fitness and safety of cargo spaces.
B. ensure adequate packaging of the cargo.
C. prevent delays due to quarantine restrictiors.
D. correct all defects in the ship's construction.

REFERENCE: Marine Cargo Operations by Sauerbier

(5) The S.S. Long Trip is in the port of Singapore. Before the vessel is allowed to sail, the master must raise funds to pay for required stores. The master raises the money by securing a loan on the cargo. What legal term describes the method he used to secure the loan?

A. Chattel mortgage
B. Shipowner's liability
C. Continuing obligation
D. Hypothecation

REFERENCE: The Law of Seamen by Martin J. Norris

ENGINEER

(1) When the lower edge of the spiral begins to uncover the release port in a jerk pump, the

A. pumping continues until the plunger travels its fill stroke.
B. effective pumping stroke of the plunger ends.
C. pressure drops slowly until the full stroke is attained.
D. plunger rotates to the zero delivery position until the next stroke.

REFERENCE: Maleev

(2) The distillate pump of an evaporator rated at 12000 gpd should be rated at a minimum of

A. 8.3 gpm.
B. 50 gpm.
C. 100 gpm.
D. 150 gpm.

REFERENCE: Osbourne

(3) What does it mean if a submerged tube type evaporator operating at above atmospheric pressure requires constantly increasing coil pressure to maintain capacity?

A. Heat transfer surfaces are being coated with scale.
B. The brine density is not proper.
C. Impure distillate is being produced.
D. Vapor pressure is constantly increasing.

REFERENCE: Osbourne

(4) What statement is true concerning Halon 1211 fire extinguishing equipment?

A. The agent is less effective than CO_2.
B. Halon 1211 extinguishes the fire by smothering.
C. The agent leaves no residue.
D. All of the above.

REFERENCE: Marad Fire Fighting Manual

(5) What statement is true concerning Bunker C vapors?

A. The vapor cannot be ignited by a spark unless the vapor is at its flash point.
B. The vapor is nontoxic in all concentrations.
C. The vapor cannot be ignited by a spark unless it is at its autoignition temperature.
D. The vapor is heavier than air.

REFERENCE: CG-174

ANSWERS

Deck
1. B; 2. B; 3. A; 4. A; 5. D

Engineer
1. B; 2. A; 3. A; 4. C; 5. D

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications may be obtained from the nearest marine safety office, marine inspection office or by writing: **Commandant (G-CMA/TP26), U.S. Coast Guard, Washington, DC 20593.** Because changes to the rules and regulations are made from time to time, these publications can be kept current between revisions only by referring to the Federal Register. (Official changes to all Coast Guard authored federal regulations are published as final rules in the Federal Register on Mondays or Thursdays.) Following the title of each publication in the table below are the dates of the most recent editions and changes, if any.

The Federal Register may be obtained by subscription ($5 per month or $50 per year) or by individual copy (75 cents each) from SupDocs, U.S. Government Printing Office, Washington, DC 20402.

CG No. — TITLE OF PUBLICATION

NOTE: This is a newly revised list; please check carefully for changes.

CG-101-1 Specimen Examinations for Merchant Marine Deck Officers (2nd and 3rd Mate) (4-1-77).

CG-101-2 Specimen Examinations for Merchant Marine Deck Officers (Master and Chief Mate) (7-1-78).

CG-108 Rules and Regulations for Military Explosives and Hazardous Munitions (4-1-72). FR 7-21-72, 12-1-72, 6-18-75, 9-26-77.

CG-115 Marine Engineering Regulations (8-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78, 3-12-79, 5-3-79.

CG-123 Rules and Regulations for Tank Vessels (8-1-77). Ch-1, 4-78. FR 1-3-77, 8-18-77, 9-12-77, 9-26-77, 9-29-77, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79, 11-19-79, 12-27-79, 1-31-80.

CG-169 Navigation Rules - International - Inland (5-1-77). FR 7-11-77, 7-14-77, 9-26-77, 10-12-77, 11-3-77, 12-6-77, 12-15-77, 3-16-78.

CG-169-1 Colregs Demarcation Lines (7-15-77).

CG-172 Rules of the Road - Great Lakes (7-1-72). FR 10-6-72, 11-4-72, 1-16-73, 1-29-73, 5-8-73, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 1-13-77, 11-3-77, 12-6-77.

CG-174 Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products (9-1-76).

CG-175 Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3-1-73).

** CG-176 Load Line Regulations (2-1-71). FR 10-1-71, 5-10-73, 7-10-74, 10-14-75, 12-8-75, 1-8-76, 7-24-78.

CG-177 Yacht Admeasurement and Documentation (9-72).

CG-182-1 Specimen Examinations for Merchant Marine Engineers License (2nd and 3rd Assistant) (4-75).

CG-182-2 Specimen Examinations for Merchant Marine Engineer Licenses; First Assistant Engineer, Steam and Motor, any Horsepower (4-76).

CG-182-3 Specimen Examinations for Merchant Marine Engineer Licenses; Chief Engineer Steam and Motor, any Horsepower (4-76).

CG-184 Rules of the Road--Western Rivers (8-1-72). FR 9-12-72, 12-28-72, 3-8-74, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 3-1-76, 6-10-76, 7-11-77, 12-6-77, 12-15-77.

* CG-190 Equipment Lists (8-1-77).

CG-191 Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (11-1-76). FR 3-3-77, 5-16-77, 8-8-77, 4-9-79, 12-6-79.

CG-227 Laws Governing Marine Inspection (7-1-75).

CG-239 Security of Vessels and Waterfront Facilities (5-1-74). FR 5-15-74, 5-24-74, 8-15-74, 9-5-74, 9-9-74, 12-3-74, 1-6-75, 1-29-75, 4-22-75, 7-2-75, 7-7-75, 7-24-75, 10-1-75, 10-8-75, 6-3-76, 9-27-76, 2-3-77, 3-31-77, 7-14-77, 7-28-77, 9-22-77, 9-26-77, 12-19-77, 1-6-78, 1-16-78, 3-2-78, 11-16-78, 1-22-79, 1-25-79, 2-12-79, 11-5-79, 12-10-79, 1-31-80.

CG-242 International Conventions & Conferences on Marine Safety (6-51).

* CG-257 Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-77). Ch-1, 3-17-78. FR 9-26-77, 9-29-77, 10-10-78, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79.

CG-258 Rules and Regulations for Uninspected Vessels (4-77). FR 9-26-77, 9-29-77, 6-14-79, 7-2-79, 12-17-79.

CG-259 Electrical Engineering Regulations (7-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78.

CG-268 Rules and Regulations for Manning of Vessels (7-1-77). FR 11-19-79.

CG-293 Miscellaneous Electrical Equipment List (6-73).

CG-323 Rules and Regulations for Small Passenger Vessels (7-1-77). Ch-1 3-17-78. FR 9-26-77, 10-25-77, 12-15-77, 7-17-78, 3-12-79, 6-14-79, 7-2-79, 12-13-79.

CG-329 Fire Fighting Manual for Tank Vessels (1-1-74).

CG-388 Chemical Data Guide for Bulk Shipment by Water (1976).

CG-403 Great Lakes Pilotage Regulations (7-76).

CG-439 Bridge to Bridge Radiotelephone Communications (12-1-72). FR 12-28-72, 3-8-74, 5-5-75, 7-11-77.

* CG-467 Specimen Examinations for Uninspected Towing Vessel Operators (10-1-74).

CG-474 When You Enter That Cargo Tank (3-76).

CG-478 Liquefied Natural Gas, Views and Practices, Policy and Safety (2-76).

CG-480 Oil Pollution Control for Tankermen (6-75).

CG-482 Benzene Safe Handling Practices (12-76).

CG-486 Shippers Guide to Hazardous Materials Regulations (Water Mode) (8-77).

CG-491 Safety for Small Passenger Vessels (8-77).

OLD CG-497, Rules and Regulations for Recreational Boating (12-78), now M 16752.2 (12-78) FR 7-19-79.

*** CG-515 Rules and Regulations for Foreign Vessels Operating in the Navigable Waters of the U.S. (2-78). FR 1976--7-8, 8-26, 9-16, 9-20, 12-13, 12-20. 1977--1-3, 5-16, 5-19, 6-16, 7-7, 7-14, 7-21, 7-25, 8-4, 8-11, 9-8, 9-12, 9-22, 9-26, 9-29, 11-10, 12-8, 12-15, 12-19. 1978--4-6, 5-18, 5-22, 6-29, 7-24, 8-10, 9-11, 9-25, 11-16, 11-20, 11-30, 12-7, 12-28. 1979--1-22, 1-25, 2-5, 2-12, 2-26, 3-29, 4-12, 4-16, 4-24, 5-3, 5-7, 5-31, 6-14, 6-21, 8-2, 8-16, 8-27, 9-4, 9-24, 10-15, 10-18, 11-1, 11-5, 11-19, 12-3, 12-10, 12-27. 1980--1-10, 1-31.

CG-518 Marine Investigating Officer's Regulations Handbook (2-78). FR 2-16-78, 4-27-78, 5-25-78, 6-15-78, 9-25-78, 10-19-78, 11-20-78, 1-25-79, 7-19-79, 9-4-79, 1-10-80.

CG-526 Utilizing the Packaged Hazardous Materials Regulations, 49 CFR (5-78).

Safety of Life at Sea: Convention, with Regulations, London, June 17, 1960.

Specifications for Merchant Vessel Equipment (Subparts of Chapter Q, 46 CFR, parts 160 to 164.

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**Under revision--CG-176 text can be found in Title 46 CFR Parts 41-69

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Admiral J. B. Hayes, USCG
Commandant

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Rear Admiral John D. Costello, USCG
Chief, Office of Operations, Member

Rear Admiral Donald C. Thompson, USCG
Chief, Office of Engineering, Member

Captain P. J. Danahy, USCG
Executive Secretary

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cover

Students of the Maritime Institute of Technology and Graduate Studies (MITAGS) react to a simulated casualty in the school's newest course, Emergency Medical Training. Upon successful completion of the class, these men will be nationally certified emergency medical technicians. MITAGS, founded in 1967 by the International Organization of Masters, Mates and Pilots, is currently undergoing extensive expansion. Find out more beginning on page 104.

maritime sidelights

NEW ANTI-EXPOSURE COVERALL APPROVED

An anti-exposure coverall has recently been approved by the Coast Guard as a Type V special purpose exposure PFD. This coverall is designed to provide extra hypothermia protection but is not an approved replacement for an "exposure suit." The suit was approved as Type V recreational and Type V commercial PFD. Because of its slow donning time in the recreational field, the coverall is an approved replacement for a required Type III PFD only when worn. Therefore, appropriate PFD's are still required on board if the coverall is not worn for the entire time afloat. In the commercial environment the suit is an acceptable substitute for a work vest, thus is only an additional item of equipment and not a replacement for the required PFD.

This is the first Coast Guard approved PFD of its kind, with others now pending. Established guidelines for approval and requirements for additional labeling are available. For further information, contact Ensign Steven Weiss or Mr. Wehr (G-MMT-3), U.S. Coast Guard Headquarters, Washington, DC 20593; (202)426-1444.

MAY 22 NATIONAL MARITIME DAY

President Carter has issued a proclamation designating May 22 as National Maritime Day, 1980. The occasion is celebrated each year to honor the men and women of all sectors of the maritime industry.

"Throughout the history of the United States, trade and shipping have made a vital contribution to the Nation's growth and economic vitality," the President said. "Today, the American Merchant Marine continues to aid the development of American enterprise and to foster the well-being of all American citizens by linking U.S. industries, farms and markets with our overseas trading partners.

"In addition, our Merchant Marine has shown valor and dedication in providing logistic support to United States military forces in times of national emergency."
(Reprinted from the AWO Weekly Letter of April 5, 1980)

VTS HOUSTON NEWLETTER

The Coast Guard Vessel Traffic Service in Houston plans to begin publishing its own newsletter soon and is developing a mailing list for this and other VTS related material. Those desiring to be placed on the list are requested to write Commanding Officer, Coast Guard VTS, Houston/Galveston, P.O. Box 501, Galena Park, TX 77547, or call (713) 674-8488 during regular business hours.
(Reprinted from the USCG Marine Safety Newsletter, Houston)

SHIPBOARD MEDICINE COURSE

In 1978 the IOMM&P established a one month Shipboard Medicine Course for their members at the Maritime Institute of Technology and Graduate Studies (MITAGS) near Baltimore.

Masters and Mates graduating from this course become nationally certified as Emergency Medical Technicians. Many of the Deck Officers serving on Lykes vessels have taken advantage of this opportunity. As a result, medical care on their ships has improved as shown by a recent happening.

Captain William H. Weiss, a recent graduate of the MITAGS course, Mr. James A. Powell (Chief Mate) and Mr. Kirk A. Peel (1st Asst. Engr.) on the SS CHARLES LYKES maintained the life of a crewmember over a two day period until air evacuation to a shore based hospital became possible. During that time they had to deal with several episodes when the heart stopped and an apparent blockage to breathing developed. Cardiopulmonary resuscitation, therefore, had to be used more than once.

The Master's skills acquired through the Shipboard Medicine Course at MITAGS and the knowledge of the two assisting officers undoubtedly contributed to the eventual safe evacuation of the crewmember. Without this background, the result might well have been a disaster.

We congratulate the officers involved in this outstanding treatment effort, and especially Captain Weiss for spending one month of his time taking the Shipboard Medicine Course.
(Reprinted from the Lykes Lines Safety Bulletin, issue no. 267, April 1980. For further information on MITAGS courses, see page 104.)

1981 OIL SPILL CONFERENCE

The seventh biennial Conference on the Prevention, Behavior, Control and Cleanup of Oil Spills will be held on March 2-5, 1981, at the Atlanta Hilton, Atlanta, Georgia. More than 1,500 delegates and exhibitors from all over the world are expected to attend. Sponsors of the international conference are the American Petroleum Institute, the U.S. Environmental Protection Agency, and the U.S. Coast Guard.

Technical, scientific, and socio-economic-legal papers for presentation at the conference are invited. The 115 papers selected will be chosen from abstracts submitted by June 2, 1980. These abstracts must be in English, 200 to 250 words, and information being reported on must not be already described in any other open technical or scientific publication. Authors will be notified of selection by July 28, 1980.

The conference will stress spill prevention, development of new techniques for use in inland, coastal, deepwater and Arctic oil spill control operations, and spill liability and damage assessment. Papers are particularly sought in clean-up operations, cooperatives, training techniques, monitoring,

Continued on next page.....

new prevention and control techniques, new equipment developments, case histories of specific spills, oil transfer practices, offshore platform operations, deepwater port operations, dispersants, fate and effects of oil, natural resource damage assessment, and national and international socio-economic-legal aspects.

Submit abstracts **no later than June 2, 1980** to:

CDR Ted Leigh (G-DMT/54)
U.S. Coast Guard Headquarters
Washington, DC 20593
(202) 426-2700

SEVENTH OCEAN ENERGY CONFERENCE

Captain Jacques Cousteau, noted oceanographer and environmentalist, Governor George Ariyoshi of Hawaii, and Congressman Don Fuqua of Florida, chairman of the House Committee on Science and Technology, will speak at the Seventh Ocean Energy Conference to be held June 2-5 at the Shoreham Hotel in Washington, DC.

Captain Cousteau will speak at the June 3 banquet where he will present his perspective on ocean energy. Governor Ariyoshi, the keynote speaker at the luncheon on June 3, will sum up his state's substantial activities in ocean energy. Congressman Fuqua will open the conference with a discussion of legislation pending to establish U.S. policy and goals regarding the development of ocean energy.

More than 800 persons from all over the world are expected to attend the conference, which has the theme "Ocean Energy - A Time of Opportunity, A Time for Action." The conference will explore all aspects of the conversion of energy from ocean thermal gradients (OTEC), waves, currents and salinity gradients. Highlights of the four-day conference include:

Presentation of more than 70 papers on the status of ocean energy development, including highlights of OTEC demonstration systems, Mini-OTEC and OTEC-1, and international programs.

An executive seminar, providing an intensive, senior-level presentation of key ocean energy technical and program issues and goals.

Plenary session with a broad overview of U.S. and international ocean energy programs.

Plenary workshops with working group reports on needed actions to meet conference goals.

An expanded exhibits program demonstrating the capabilities of the ocean energy industry.

Gibbs & Cox, Inc., naval architects and marine engineers, have organized the conference on behalf of the Ocean Systems Branch of the U.S. Department of Energy. For further information, contact Mr. Robert Scott, Gibbs & Cox, Inc., 2341 Jefferson Davis Highway, Arlington, VA 22202.

GREEN BUOYS TESTED

Are green buoys more visible than black ones? Mariners cruising off Miami, Florida and in the Savannah River in Georgia will be able to help the Coast Guard find the answer.

As a part of a nationwide test, one black buoy in the Miami Main Channel (lighted buoy #3) and one black buoy at Bloody Point Range at the entrance to the Savannah River (lighted bell buoy #7) have been replaced with similar green buoys.

Miami Main Channel lighted buoy #3 is located one mile east from Government Cut, the entrance to Miami Harbor. It is 8 feet in diameter, 26 feet long, weighs 13,000 pounds, and is held in place by an 8,500-pound sinker. Bloody Point Range lighted bell buoy #7 is located 16 miles east of Savannah and has the same measurements of the Miami buoy.

The Coast Guard said that green daymarks are in use now on beacons in the U.S. and have received wide acceptance. Green buoys have been in use for some time outside of North America and, in fact, have been recommended by the International Association of Lighthouse Authorities for Europe and other countries.

If you sail the areas noted, compare the two colors and send comments in writing to the Commander (oan), 7th District, 51 SW 1st Ave., Miami, FL 33130.
(*Reprinted from the* Commandant's Bulletin, *issue 13-80)*

The publication load for the month of April was exceptionally light. Aside from local rulemaking efforts (drawbridge regulations and safety zones), only seven projects were published. These included two final rules, one interim final rule and four proposed rules.

On 2 April 1980 the final rules on CGD 76-033A, Exposure Suits for Great Lakes Vessels, and the interim final rules on CGD 79-081A, Evaluation Programs for Licensing and Certification of Foreign Tank Vessel Personnel were published. The third final rule was not published until 21 March, when Tank Vent Piping for Great Lakes Vessels (CGD 79-083) appeared.

Four proposed rules were also published. The first of these, CGD 80-02, revised 46 CFR parts 30 and 151 and was published on 7 April 1980. The second proposed rule, Special Service Load Lines Vessel Operations During Hurricane Season (CGD 79-142), was published on 21 April 1980. The final proposed rules published on 1 May 1980 both pertained to the Outer Continental Shelf. These were CGD 78-160, Outer Continental Shelf Activities Regulations, and CGD 79-152, the Rules for Tank Vessels Transferring Outer Continental Shelf Oil.

Continued on next page.....

KEYNOTES.....

The Tanker Safety and Pollution Prevention Regulations have been removed from the Keynotes section. The final rules on this package have all been published with the exception of CGD 77-058(b)(c)(d), Segregated Ballast and Tank Cleaning Regulations, scheduled to appear in June of this year.

There are no new regulatory efforts underway this month and no public hearings are scheduled in May or June.

Any questions regarding regulatory dockets or companies and individuals wishing to speak at public hearings should notify Capt. P. J. Danahy (G-CMC/24), U.S. Coast Guard Headquarters, 2100 Second St. SW, Washington, DC 20593; (202)426-1477.

* * *

QUALIFICATIONS OF THE PERSON IN CHARGE OF OIL TRANSFER OPERATIONS, TANKERMAN REQUIREMENTS CGD 74-44, 74-44a

These regulations will redefine and establish qualifying criteria for the certifying of individuals engaged in the carriage and transfer of dangerous cargoes in bulk.

It has been found that most pollution incidents are the result of personnel error; consequently, the minimum qualifications of persons involved in handling polluting substances should be specified.

As stated in the last issue, these projects have been withdrawn (44 FR 25243). New notices of proposed rulemaking (NPRM's) which were anticipated in June have been delayed and are now scheduled for publication in April of this year under new Coast Guard docket numbers 79-116 and 79-116a.

REVISION OF ELECTRICAL REGULATIONS CGD 74-125(A)

This regulation will constitute a general revision and updating of the electrical regulations to conform with latest technology. It will include steering requirements for vessels other than tank vessels.

This revision is occurring because industrial standards for electrical engineering have changed in the past few years, and the regulations must be brought up to date to reflect current industry practices.

An initial NPRM was published on 27 June, 1977 (42 FR 32700). A supplemental NPRM was published as CGD 74-125A on 3 March, 1980 (Part VII).

NEW TANK BARGE CONSTRUCTION CGD 75-083 UPGRADE OF EXISTING TANK BARGE CONSTRUCTION CGD 75-083a

This action is comprised of two regulatory projects centered on tank barge construction standards. These projects were the result of a Presidential initiative of 17 March 1977, directing a study of the tank barge pollution problem. One project will address new barge construction while the other will pertain to existing barges. Regulatory documents for both will be published at the same time and joint public hearings have been held.

In July 1977, the Coast Guard began a reexamination of the tank barge construction standards. It was determined that new construction would be treated separately from existing barges. An advance notice of proposed rulemaking (ANPRM) was then issued to gather additional data and assess impacts related to existing barges.

The new NPRM on tank barge construction, withdrawing the prior NPRM and the ANPRM for existing tank barges, was published as part VI of the 14 June 1979 Federal Register (44 FR 34440 and 44 FR 34443, respectively).

Public hearings were held on the dockets as follows: 2 August 1979, Washington, DC; 15 August 1979, Seattle, WA; 23 August 1979, New Orleans, LA; 5 September 1979, Washington, DC; and 7 September 1979, St. Louis, MO. The comments given at the hearings have been incorporated in the docket.

On Thursday, 8 November 1979 a Federal Register notice extended the comment period on the project. This extension was based on the continued public interest and ran to 1 December 1979.

A Supplementary Notice was published as Part III of the 13 March 1980 Federal Register (44 FR 16438). This notice informs the public of a deferment in the rulemaking process for these dockets. The comments received have raised significant questions concerning these proposals. It was decided that the entire tank barge pollution problem warranted a carefully considered study by a recognized independent body. The National Academy of Sciences/-National Research Council will conduct the study. Part of the study, a two day workshop, was held on 15 and 16 April 1980. The study will be completed by the end of January 1981. The Coast Guard will defer any further rulemaking on these proposals until completion of the study and the dates in the proposals of 14 June 1979 are no longer valid. If the Coast Guard should pursue further action on these proposals, a new time table will have to be developed.

Anyone wishing to obtain copies of the rulemaking may do so by contacting Capt. P. J. Danahy, Marine Safety Council (address is given in the introduction to the Keynotes section).

POLLUTION PREVENTION, VESSELS AND OIL TRANSFER REGULATIONS CGD 75-124a

This regulation would reduce accidental or intentional discharge of oil or oily wastes during vessel operations.

The basis of this regulation is threefold. First, there is the need to reduce the number and incidence of oil spills. Second, this regulation will help to clarify the existing rules. Finally, this regulation covers the additional requirement for oil-water separators under the 1973 International Convention for the Prevention of Pollution from Ships.

An NPRM was published on 27 June 1977 (42 FR 32670) and a supplemental NPRM was published 27 October 1977 (42 FR 56625). Due to substantive changes in the regulation, a new NPRM is scheduled for April 1980.

Continued on next page.....

KEYNOTES.....

SEGREGATED BALLAST AND TANK CLEANING REGULATIONS GCD 77-058(b), (c) and (d)

This four-part regulation was initiated when President Carter directed the Secretary of Transportation to issue new rules for oil tanker standards, which were to include segregated ballast on all tankers and double bottoms on all new tankers which call at American ports. The provisions of these proposed regulations have been changed by the February 1978 Intergovernmental Maritime Consultative Organization (IMCO) Conference to include Crude Oil Washing (COW) and Clean Ballast Tanks (CBT).

The NPRM was published 16 May 1977 (42 FR 24868). As a result of the IMCO Tanker and Pollution Prevention Conference of February 1978, a new NPRM was issued on 12 February 1979 (44 FR 8984). Public hearings were then held in March in Washington, DC and San Francisco, CA; 265 comments were received on the docket and analyzed. The final rules are scheduled to appear in June 1980.

CONSTRUCTION AND EQUIPMENT EXISTING SELF-PROPELLED VESSELS CARRYING BULK LIQUEFIED GASES CGD 77-069

These regulations would amend the current ones to include the substantive requirements of the "Code for Existing Ships Carrying Liquefied Gases in Bulk," adopted by the Intergovernmental Maritime Consultative Organization (IMCO). The use of liquefied gas has increased, as have the problems associated with it. Due to its unique properties and the dangers associated with them, new regulations are being drafted. The environmental impact statement and regulatory analysis were completed in February 1979 and an ANPRM on these regulations is anticipated in September 1980.

LICENSING OF PILOTS CGD 77-084

This regulation takes into account the problems caused by increased ship size and unusual maneuvering characteristics. The proposal would require recency of service for each route upon which a pilot is authorized to serve, licensing with tonnage limitations commensurate with pilot experience, and consideration of ship-handling simulator training for pilots of very large vessels. A regulatory analysis and work plan were completed in October 1978. An NPRM is expected in May 1980.

REVISION OF 46 CFR 157.20-5 DIVISION INTO THREE WATCH REGULATION CGD 78-037

This revision would have required an adjustment in vessel manning requirements, to bring them in line with current legislation. It would change the requirements which identify personnel who must be used on the three watches and personnel who may be employed in a day working status. An NPRM formerly scheduled to be published on this docket in January 1980 will not be published, as the docket has been withdrawn.

TANK VESSEL OPERATIONS REGULATIONS, PUGET SOUND CGD 78-041

This regulation governs the operation of tank vessels in the Puget Sound area. It was initiated to reduce the possibility of environmental harm resulting from oil spills in Puget Sound. This is to be accomplished by governing the operation of tankers and reducing the risk of collision or grounding.

Former Secretary of Transportation Brock Adams signed a 180-day Interim Rule on 14 March 1978 prohibiting entry of oil tankers in excess of 125,000 deadweight tons in Puget Sound; this appeared in the Federal Register of 23 March 1978 (43 FR 12257). An ANPRM was published 27 March 1978 (43 FR 12840). An extension of the interim rule was published in the Federal Register in order to allow the Coast Guard adequate time to complete this rulemaking.

The public hearings scheduled 11 and 12 June in Seattle, Washington, 13 June in Mt. Vernon, Washington, and 14 June in Port Angeles, Washington, have been completed and all the comments received have been entered in the docket files for consideration. The extension of the interim navigation rule was published 21 June 1979 (44 FR 36174). This extension was effective 1 July and will be in effect until the Coast Guard prints notice of its cancellation. Copies of documents or the transcripts of the hearings may be obtained by writing to the Marine Safety Council. A final rule on the docket is currently expected in December 1981.

EIGHT-HOUR DAY VOLUNTARY OVERTIME CGD 78-146

This docket is a review of the Eight Hour Day, Voluntary Overtime regulation in 46 CFR 157.20-10, which states that no licensed officer should be required to be on duty more than eight hours per day except in extraordinary circumstances. Existing regulations, however, do not address overtime or consider any possible "fatigue factor." Recent Coast Guard studies have shown that this factor has a profound effect on reaction time and judgement, therefore the regulatory project has been withdrawn.

PERSONNEL JOB SAFETY REQUIREMENTS FOR FIXED INSTALLATIONS ON THE OUTER CONTINENTAL SHELF CGD 79-077

This regulation is concerned with the health and safety requirements for installations engaged in oil field exploration and development. This action was mandated by pending Outer Continental Shelf legislation. It will provide more comprehensive protection for personnel employed in vessels and installations in the oil trade. The work plan received by the Marine Safety Council (MSC) in early July calls for an NPRM in March 1980.

SHIPBOARD NOISE ABATEMENT STANDARDS CGD 79-134

These standards will establish acceptable sound levels for each of

Continued on next page.....

the various vessel compartments based on the latest technology. The standards will differentiate acceptable sound levels for both existing vessels and new vessels, acceptable methods of compliance, and will establish a hearing conservation program.

During the development of these standards, the U.S. Naval Ocean Systems Center (NOSC), San Diego, California was contracted by the Coast Guard to evaluate sound levels aboard several U.S. merchant vessels, to study the data obtained, and then to define the extent of the noise problem. Based on this data and other information available, they were asked to recommend a set of noise levels to be used in the control and/or elimination of the shipboard noise problem for the proposed standards.

This study has been completed. Copies are available through the National Technical Information Service (NTIS), Springfield, Virginia 22161; request NOSC technical documents numbers 243, 254, 257, 267 and 405.

PERSONNEL AND MANNING STANDARDS FOR FOREIGN VESSELS CGD 79-081(A)

This regulation, deemed necessary to reduce the probability of oil spills, would establish minimum manning levels for foreign tank vessels operating in U.S. navigable waters. It would also establish procedures for the verification of training, qualification and watchkeeping standards. Interim final rules were published on 7 April 1977 (45 FR 23425).

PERSONNEL SAFETY AND HEALTH REQUIREMENTS FOR INDUSTRIAL VESSELS CGD 80-15

Similar to 79-077, this regulation covers the vessels engaged in exploration, supply and support on the Outer Continental Shelf (OCS). Mandated by pending OCS legislation, this project covers the growing fleet of vessels which perform the variety of industrial functions involved in the exploration and development of offshore resources. The regulations, designed to provide a more comprehensive personnel protection, are scheduled for an advanced notice of proposed rulemaking (ANPRM) in October 1980.

* * *

A complete listing of all Coast Guard proposed regulations, both "significant" and "non-significant," appeared in the Thursday, February 22, 1980 Federal Register (45 FR 13312).

THE COAST GUARD HAS NO PUBLIC HEARINGS SCHEDULED AT THIS TIME FOR MAY OR JUNE.

NOTE: The April Keynotes contained an error in the introductory paragraph. CGD 79-066, COLREGS Demarcation Line, Boston Harbor, was published in the Federal Register of 10 March 1980, page 15175, not in the 6 March issue as noted.

A Dying Habit

Smoking

If you smoke, you may be one of the thousands who will die of lung cancer this year.

When you smoke . . . your cigarette produces a mixture of particles and gases that irritate the breathing system and lead to its impairment. One of the gases, carbon monoxide, is a poison in high concentration. Nicotine is also an irritating tar that is a high-dose poison which affects the heart rate and blood pressure.

It has been proved that smoking is an important factor in death from heart disease. Heart disease causes one-third of all deaths in the United States and fatal heart attacks are much more common among smokers than non-smokers.

Your smoking also affects others who are forced to breathe polluted air. If you have children, you know they look up to you and may imitate you.

To smoke or not to smoke is an important decision in your life! Why not face the facts:

- Smoking may well be our No. 1 public health enemy.
- It costs money, lives, pain.
- It is a factor in six times as many deaths as car accidents.
- About 95 percent of smokers' lungs show abnormal changes.
- Smoking is a *dying* habit!

The R.E.O. Looks at Radar

By W. H. Lindsay

The opinions or assertions contained herein are the private ones of the author and are not to be construed as official or reflecting the views of the Commandant or the Coast Guard at large.

You are master of a vessel proceeding to sea and have just dropped the pilot. Visibility is bad and the forecast is for worse. The brand new 10cm radar that the company just paid $20,000 for has just gone blank. The 3cm is giving a poor presentation of the close-by rocky coastline and seems to be getting worse. You call your radio operator (RO/REO), electronics technician (ET), whatever, to the bridge. He advises you that the high voltage supply to the picture tube on the 10cm has failed and you have no spare. He can tune the 3cm, but should do so soon while he still has targets, but he wants to stop the antenna on target to do so. Poor visibility and no radar! The U.S. Coast Guard says the vessel shall not sail without an operating radar, but neither the Coast Guard or FCC does other than specify the bands on which radars may operate. Would you by now agree that it is high time that some sort of performance and/or reliability standard be developed for a navigational aid as vital as radar? The author of this little complaint, as the RO/REO/ET you called to the bridge, would like to get in his two cents worth before the Coast Guard, FCC or whoever, sets the standards, does so, and effectively freezes input.

ENVIRONMENTAL TESTING

Many radars that work fine under laboratory or factory conditions supplied by public utility power lines, become totally unreliable after a short time in a shipboard environment. When the company buys that new radar, you hope that it will fail rarely, if at all. In order to be reasonably sure of this, it should be subjected to several cycles of over and under voltage and line frequency variations at least double that which could be expected in the worse case where they would be installed.

All major components should be subject to appropriate vibration, temperature, and humidity tests. The indicator, T/R unit, power supply if separate, and any other items external to major units should be cycled on and off an appropriate number of times, subjected to high and low temperature, high humidity, and vibration.

While you hope your new radar will never fail, experience tells you otherwise. When that time comes and it does fail, the simpler the radar is the sooner it will be back in service. The simple radar has fewer things to go wrong to begin with, hence, other things being equal, it is more reliable, as well as possibly cheaper. No matter how sophisticated a radar is, no matter how convenient some additional features such as "north up," EBM (electronic bearing marker), AFC (automatic frequency control), etc. are, it is useless if not operating. If you must have these extra features, most of them with the exception of AFC, can be found in a separate indicator, switchable between your basic relative motion radars. There is at least one good anti-collision indicator with all these features, and more, presently on the market which is sold independently from the radars from which it will get its information.

SERVICEABILITY

When that inevitable failure does occur, its correction at sea will be much faster and easier if some thought has been given beforehand to serviceability. Five things are vital.

a. Accessibility. All electronic components are subject to possible failure. If the component in question is hidden behind another subassembly, which in turn is behind a hinged instrument panel, which is in turn behind a bolted access door, in-circuit proof of whether or not that particular component is at fault is going to be more cumbersome than if it was out front. Electronic servicing was greatly advanced by the advent of the printed circuit board. Yet some designers negate the inherent better serviceability of the printed board by permanently soldering them in with short leads encased in a welded enclosure where they are completely inaccessible. Shielding doesn't have to be designed like a bank vault to be effective. To the greatest extent possible circuit boards and other units should be removable on a plug-in basis.

b. Service information, i.e., the technical manual and schematic. No ship-owner should ever buy a radar that does not include complete service information in the language of the technician who must service it. Schematics should be large and well printed. There is currently on the market a radar whose service manual is woefully incomplete and erroneous, and whose schematics have been so reduced in size and poorly printed as to be totally unreadable. Where it is necessary to put schematics on more than one page, the connections from one schematic to the other should be clearly identified, or be accompanied by an easily followed interconnection diagram. There should be layout drawings to clearly identify major and minor components.

Detailed drawings of front-end components should clearly show construction and operation of such items as crystal mixers, probes, etc. Printed circuit board drawings should be liberally supplied with voltage readings, and wave forms, especially at test points. These should be numerous and clearly identified. In general, a multiplicity of test points is preferable to a few built in meter positions.

c. Spare parts stock on board. Many manufacturers today are designing their 10 and 3cm radars to be exactly alike except for necessary differences in front-end parts. There is much to be said for this. Except for front-end items, only one set of spares need be carried. There is an argument for going even further and having both radars identical 10cm or 3cm units. In this case only one set of spares is required, and in addition it should be possible to design them so that all major subassemblies are interchangeable. It would not take a great deal of ingenuity in these circumstances to create at least one operating radar out of two radars malfunctioning in different sections.

d. Need for tools and instruments. Your ET/RO cannot work effectively without a minimum of these. Most of the items should already be aboard. Deserving mention are any special tools such as klystron, tuning tools, crystal, wrenches, etc. These should be duplicated in case of loss. A good VOM and a basic oscilloscope are essential.

e. Factory training. It is a prerequisite that your shipboard RO/ET, etc., has had a basic background in electronics servicing, with at least one good general course in radar. In addition there must be some familiarization on the particular set you have aboard. Assuming a relatively simple, well designed radar with a good manual, and schematics as outlined above, a really good RO can do much toward familarizing himself just by reading the manual and going through the equipment with a meter and scope while it is still in good operating order.

Much can be learned by an informal briefing by a cooperative shoreside factory authorized serviceman and by working with him whenever he is called. Much better, but not generally available, would be periodic short factory sponsored training courses at the major sign-on ports. It is the author's opinion that the shipping industry should persuade the manufacturers to do this. I repeat, this presupposes a good general background in radar. The factory cannot be expected to impart basic knowledge.

IMPROVING RELIABILITY AND SERVICEABILITY

Having covered the radar in general, let's take a quick trip through the equipment from antenna to PPI viewing scope and see what we can do to improve reliability and serviceability. Due to the fact that the front-end of the receiver cannot be tuned without targets, it is highly desirable to have sufficient control over the antenna drive so as to be able to "aim" the antenna on targets. This is not possible on all the radars on the market today. The antenna drive unit should of course be mechanically rugged to withstand heavy wind loading, and on some ships, severe vibration at the masthead. It should be impervious to moisture, particularly wind driven salt spray. Environmental testing should be done to insure this. The wearable parts, especially the drive components, should be easily replaceable. Access plates should be on retainer chains. These parts have been known to blow away.

This is the place to mention a couple of items that are the responsibility of the naval architects and shipyards, specifically the location of the antenna and the design of the antenna platform itself.

All service on the antenna is done under difficult conditions. If the service personnel are not subject to stack gas, then they are buffeted by strong winds. There should be some sort of tool and parts receptacle welded to the platform or mast convenient to the antenna pedestal to prevent tools and parts from being blown away. The platform itself should be sturdy, and as wide and as easily accessible as reasonably possible, and should completely encircle the antenna pedestal. a safety cut-off switch should be, and usually is, provided on the access mast. Some sort of breathing tube, or other provision to prevent breathing stack gas would be desirable. It should be borne in mind that no personnel should ever be placed directly in front of a live radiating antenna. Severe eye injury or other physiological damage could occur.

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RADAR.....

There are vessels on which the antenna has been installed on the foremast, presumably to avoid radar blind spots caused by masts and rigging. If the indicator viewing scope (PPI) presentation is that much improved, then of course such a location is justified. However, it should be recognized that this complicates reliability and service problems since the transmitter/receiver (T/R) unit must be located no further than the associated mast house to avoid losses in long wave guide runs. With the T/R unit located several hundred feet from, and several decks below the indicator unit in the wheelhouse, this means a lot of running back and forth when doing any type of service job, especially a tuning job on the receiver. In addition, the location in the mast house usually means the T/R unit is exposed to more dirt and humidity than if it were on the bridge. It would be generally more desirable if a radar mast atop the wheelhouse could be built tall enough to give the radar scanner a clear view over any other structures on the ship. From the antenna the signal travels both ways through a wave guide or other transmission line to the T/R unit. This wave guide should be kept as short and as free from bends as possible. Long horizontal runs should be avoided. the whole wave guide run should drain from top to bottom with a drain hole to prevent accumulation of moisture.

The T/R unit should be shock mounted. Automatic frequency control (AFC) is today considered a dubious advantage, and in some modern radars has been replaced by manual control. While the location of the T/R unit is to an extent governed by where the wave guide enters the house and available space in the compartment concerned, it still should be located so that it is convenient to get at and so that it has ample room around the access door. there should be a place to tie the door back out of the way, or other positive provision made to keep the door from slamming shut as the vessel rolls.

TESTING EQUIPMENT

If the particular radar being considered includes an echo box option it should be purchased, as at sea where there are no targets it is about the only way that any indication of radar operation may be gained. The manufacturers should also consider adding any other indicators of radar performance such as standing wave ratio (SWR) meters, receiver noise level indicators, etc., that can economically be included.

From the T/R unit the signal goes to the radar indicator which includes the plan position indicator (PPI) viewing screen and associated display controls and circuits. This unit should be shock mounted. The location of the indicator will be governed primarily by its convenience for the navigating personnel who will use it and its relation to other equipment on the bridge. After satisfying these primary considerations, the next items would be the same convenience of service accessibility mentioned in connection with the T/R unit. Lastly, the closer the indicator is to the T/R unit the better. It will make for shorter cable runs as well as more convenient servicing.

Considerable simplification of the basic radar indicator unit could be accomplished by elimination of the "true bearing" or "north up" presentation, leaving this feature to the more sophisticated anti-collision indicator. By so doing, it could be possible to eliminate the control transformer, differential generator and servo amplifier from the basic indicator.

While the author does not presume to instruct the manufacturer's engineers in details of radar design, he would none the less appreciate reasonable consideration of the problems faced by those of us who have to maintain the equipment when the ship is underway. If this little essay does anything at all to accomplish this, it will have succeeded in its purpose.

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About the Author

William H. Lindsay

W. H. Lindsay attended the New Mexico Institute, Washington State University, and the Technical Institute for Marine Electronics. He spent eight years as a mining company electrician and two years in electronic manufacturing.

Mr. Lindsay has spent the last 30 years as R/O and REO on numerous freighters, tankers and passenger ships, and is presently working aboard the S/S KEYSTONE CANYON. He is a member of the American Radio Association.

Lessons from Casualties

In June 1979 five men died due to lack of oxygen in a ballast tank of a lifting barge undergoing cold work repairs and maintenance. The barge was moored in Curacau Harbor, Netherlands, Antilles when the accident happened. While the results of a formal inquiry have not yet been published, the following initial information has been obtained from the local marine chemist.

At approximately 0900, a workman opened the access fitting the starboard side ballast tank, located just forward of the after peak tank. He then, for reasons unknown, entered the tank and immediately collapsed, falling to the bottom of the tank. The ballast tank is 20 feet high and contained water to a depth of 2 feet on the day of the casualty. A second workman nearby quickly descended into the tank, attemptin a rescue. He too collapsed and fell to the tank bottom, unconscious. Next, three divers who had just completed cleaning the barge's external underwater hull and had climbed back to the main deck, arrived at the access to the ballast tank. One by one they entered the tank, without oxygen breathing equipment, and were overcome immediately. The master of a work vessel in the vicinity of the barge noticed the commotion and came aboard the barge. He observed the five men floating unconscious in the water at the bottom of the ballast tank. Without entering the tank, he withdrew to raise the alarm. An emergency team from the local fire department, properly equipped with breathing apparatus, soon arrived and brought the casualties out of the tank. All efforts to revive the five men were unsuccessful.

Subsequent tests showed that the ballast tank atmosphere contained only 4 percent oxygen by volume. As discussed in a previous article (*Proceedings* Vol. 36, No. 4, May 1979, p. 91), an atmosphere containing only 6 percent oxygen by volume will cause unconsciousness within a few seconds, followed by convulsions and immediate death. Therefore, once each of the five victims lowered himself far enough into the ballast tank to breathe the depleted oxygen environment, he probably lost consciousness and fell. Death could have occurred as a result of the fall from the ladder, asphyxia, or drowning in the two feet of water in the tank bottom. The conclusion of the above referenced *Proceedings* article is worth repeating:

"Accidents due to oxygen depletion in confined spaces can occur aboard any vessel, from the largest tanker down to the smallest fishing boat. Age, experience, or even training does not grant immunity from this type of casualty. Confined space entry accidents frequently result in death for both the person originally entering the space and for the well-intentioned but untrained and unequipped rescuers. These deaths are avoidable, yet they occur with a tragic regularity.

"Personnel entering enclosed spaces must be instructed in the recognition of possible hazards and also in proper entry procedures. Tank entry procedures must be well-defined, well-understood, and strictly followed. Providing sufficient training and equipment for back-up personnel is also a must. Finally, frequent repetition of this training/instruction will serve to reinforce awareness of the hazards of oxygen-depleted spaces.

"STOP—THINK—PREPARE before entering any enclosed space. A minute of preparation might save your life, and the lives of those who could die trying to save you in the event of an accident."

THE MARITIME INSTITUTE OF TECHNOLOGY AND GRADUATE STUDIES

Simulation training—it's the alpha and omega of the Maritime Institute of Technology and Graduate Studies (MITAGS). Once a pioneer in the development and use of simulators for marine training, MITAGS continues to lead the way in a field which has gained worldwide popularity.

Under the direction of a man with 27-plus years of simulation experience, the school makes extensive use of simulators in training deck officers to make rapid, accurate decisions when faced with potentially dangerous or emergency situations. Obviously, learning from mistakes is not a suitable means of gaining experience aboard today's outsized vessels—if the wrong decision is made, one may not survive to do it right the next time!

MITAGS was officially founded in 1967 by the International Organization of Masters, Mates and Pilots (IOMM&P) and its contract companies in response to a deck officer shortage during the Vietnam conflict. The IOMM&P created for its members a license advancement program called the Masters, Mates and Pilots Advancement Training Education and Safety Program (MATES for short). The MATES program was first offered at the Texas Maritime Academy. Later, the program was moved to Houston, then, Baltimore; and finally to its present site, Linthicum Heights, Maryland, in 1970. Over the years, the scope of the program expanded to meet the demands of an increasingly complex marine technology. As the purpose of the program broadened, it evolved into a full curriculum and the name was changed, accordingly, to the Maritime Institute of Technology and Graduate Studies.

At present, the 50-acre school facility has two buildings. The academic building includes adminstrative and faculty offices, simulator rooms, a media resources center, and classrooms. The resident building houses a cafeteria, recreation area, health club, and spacious, private student accommodations. Married officers are encouraged to bring along their families during their stay at MITAGS. All school-related expenses are covered by IOMM&P contracted companies.

About 100 students, mostly licensed deck officers who are members of the IOMM&P union, are enrolled in MITAGS at any given time. Some non-members are permitted to attend on an *ad hoc* basis, such as officers of the U.S. Coast Guard and foreign deck officers, particularly those from developing nations. Simulation training has proven to be especially

effective with the type of students attending MITAGS. These experienced professionals are task-oriented and perform well when given practical, realistic exercises rather than excessive academics.

The primary purpose of MITAGS is to enable licensed deck officers to enhance professional skills. The MITAGS curriculum is patterned according to student needs. Courses are not based upon hypothetical situations, but upon real-life on-the-job problems. Since MITAGS students are already professionals, they are well qualified to critique the classes offered at the school and each student is given the opportunity to do so. New courses are developed in part as a result of their comments and suggestions. The MITAGS curriculum is divided into several major areas of maritime study; courses are modified from time to time to reflect the constantly changing marine technology. Most courses are one month long.

The **Marine Cargo Operations** course is available for both experienced tankermen and deck officers who desire to sail on tankers. Cargo transfer operations aboard both tanker and dry cargo vessels are practiced on a simulator patterned after an 80,000 DWT tanker, the most sophisticated liquid cargo simulator currently in existence. The course opens with a review of the basic components of tank vessels, progresses to practical operational aspects of the modern tank vessel, and includes in-depth examination and familiarization with the operation and maintenance of cargo pumps. Officers are taught safety, firefighting, chemical hazards, tank entry, cargo characteristics, and pollution control. All class members receive firefighting training at the MARAD Firefighting School in Earle, New Jersey, which qualifies them for a U.S. Coast Guard firefighting certificate. The course also covers Coast Guard regulations for the installation and operation of crude oil washing, inert gas systems, and tank cleaning. The end result of the Marine Cargo Operations Course is to prepare deck officers to assume cargo transfer officer responsibility aboard modern tank vessels.

Liquid Cargo Operations Simulator

Admiralty Law and Ship's Business are covered in a 4-week class exploring the legalities associated with vessel operation, the jurisdiction of various federal regulatory agencies, and general ship's management. Deck officers enrolled in this class are led step by step through the procedures of a typical civil suit for damages; they study marine insurance and cargo damage claims, hazardous materials regulations, and rules of the road. The Coast Guard's role in investigation of collisions is discussed, as well as license prosecution proceedings that may result from such an investigation. The final week of class is spent visiting ongoing trials to promote familiarity with courtroom procedures. This course was established to aid deck officers in learning the potential legal liabilities attendant to the operation of a vessel.

All-Weather Navigation Simulator

The MITAGS **All-Weather Navigation Course** uses a specially developed technique known as situation recognition. Once students have shown satisfactory on-scope plotting ability, they are given situations which are unsolvable using conventional on-scope plotting procedures and are taught to resolve them using situation recognition. This technique allows a radar observer to directly read the radar scope and to quickly predict the effect of a change in his ship's course or speed on any target's CPA. This class utilizes the largest radar simulator in the world, which will be even larger after renovation this spring. Each student must spend at least 16 hours of practice in the simulator during his first week of class, to build up speed and develop accuracy, increasing to a minimum of 35 hours the last two weeks. Exercises become more and more complex as the student progresses, incorporating trial maneuvers, determination of collision risk and random factors. Students are also given the opportunity to become familiar with the most modern collision avoidance systems currently available. Upon completion of this course, navigation officers should be prepared to handle all situations which might be encountered in restricted visibility.

Continued on next page.....

The **Electronic Navigation** course introduces officers to the theory and operation of the major radio navigation systems used for merchant ship navigation throughout the world. The hands-on training in this class familiarizes deck officers with all types of radio navigation equipment currently in use, so that they can use all makes with confidence. LORAN-C, Decca, OMEGA, Transit Satellite and radio beacons are compared and their performance measured against typical navigational requirements. By employing the actual equipment used aboard ship, realistic conditions of signal availability, signal noise, and manmade interference can be experienced by students.

The **Ship's Control Systems** course is a kind of "mini-engineering" course for deck officers, covering the operation and control of the main propulsion system, the electrical generating system, the steering system, and other vital engineering systems of a ship. This course promotes understanding and better communication between deck and engineering officers, as the deck officer learns to appreciate the engineer's responsibilities and realizes how engineering problems affect his decision-making while on watch on the bridge. A computer controlled trainer, which includes an actual automated bridge console and an engineroom console destined to be original equipment for the Exxon San Francisco class vessel, is employed as a teaching aid for the class. With this, the students can readily see the interrelations of the various engineering systems in the ship required to generate the propulsion and electrical power necessary to operate the ship. Instructors insert numerous engineering breakdowns into this simulated engineering plant so that officers will realize the effect of typical malfunctions on the ship's systems and, therefore, the limitations placed on their ability to control the vessel during such situations.

The month-long **Gas Carrier** course has been designed to comply with U.S. Coast Guard regulations which require licensed deck officers who serve on LPG and LNG vessels to have a tankerman's endorsement. The course begins with the basics of LNG and LPG, including thermodynamic principles, the unique hazards of cryogenic cargoes, health and fire hazards,

Continued on next page.....

Electronic Navigation Workshop

and cargo spills on deck. Students examine the different types of modern gas carriers and their cargo handling systems. Time is spent on cargo control consoles and panels, alarm and signal transmission systems, and the rules and regulations applicable to liquid gas transport. During the final week of the course, students must exercise their training in troubleshooting and decision-making during simulated emergencies. At the conclusion of the Gas Carrier course, officers will have have practiced and documented about 20 cargo operations, including emergency procedures.

MITAGS' newest course was created in December 1979 in response to student concern over the lack of medical care at sea. The **Emergency Medical Training** course provides officers with extensive knowledge of emergency medical care, much advanced beyond standard first aid classes. The first two weeks of class consist of a basic EMT course, with national certification being awarded upon successful completion. This introduction to basic emergency care covers cardiopulmonary resuscitation (CPR), bleeding and bandaging, fractures, shock, and medical legal problems which might be encountered. The last two weeks of class progress through intermediate and advanced life support--intravenous therapy, communicable diseases, medical problems associated with the environment, burns, electrical and radiation hazards, triage, alcoholism, drug abuse and proper use of drugs in emergencies, and special shipboard medical problems. In addition, officers are taught the proper radio communication and helicopter techniques needed to facilitate emergency procedures.

MITAGS has come a long way since the inception of the MATES program 13 years ago, but the biggest changes are still ahead. The school is currently undergoing tremendous expansion; the new residence hall now under construction will double MITAGS' present student housing space. Most exciting, several new simulators are scheduled for installation during early 1981. The forthcoming Full Mission Ship Simulator is the result of five years of planning, and will be the only 360-degree seamless visual simulation in existence. This new simulator will have both day and night scene, with picture resolution of far-field objects matching the capability of the human eye. The innovative design of the Full Mission Ship Simulator includes a motion base, which provides realistic heavy weather effects for navigation purposes. It will be housed in a four-story building with a Nocturnal Simulator; each simulator measures 100 feet in diameter. An LNG Carrier Simulator is also under construction, which will provide realistic shore cargo transfer operations as well as LNG cargo handling systems. Finally, the school will have a large modern auditorium equipped to handle three-language translations during lectures.

In review, it becomes apparent that merchant deck officers must have proper training to keep up with the extensive changes occurring within the marine industry. The knowledge necessary to handle the sophisticated vessels of today can no longer be provided by experience alone. As marine technology continues to increase in complexity, programs like those at MITAGS become imperative, perhaps even mandatory, for professionals in the maritime world.

Ship's Control Systems Simulator

Hands-on training in ship's control systems.

For more detailed information on the IOMM&P Marine Institute of Technology and Graduate Studies, write to:

MITAGS
5700 Hammonds Ferry Road
Linthicum Heights, MD 21090
or call (301) 636-5700

This is the third in a series of articles on marine-related schools and organizations. The purpose of these articles is to familiarize readers with existing institutions, explaining exactly what they are and what they do, and who is eligible to join/attend.

If you would like to submit information on a particular school or organization, please write to: Commandant (G-CMC/24), U.S. Coast Guard Headquarters, Washington, DC 20593 or call (202)426-1477.

BE A SMART DUCK NOT A DEAD DUCK

Many good safety programs never get off the ground because no matter how well they are structured, they always seem to stress the negative aspects of safety. We may be told "wear your steel toe shoes or you'll break your toes," or "wear your life jacket on the barges or you'll drown." Although such statements point out valuable safety practices, it may be that they have less than maximum impact because of their negative overtones.

The Inland Waterways Safety & Health Association has instituted a safety program which stresses the positive aspects of working safely. Its effectiveness hinges on two things: first, it creates a sense of awareness in the wearing of proper safety equipment when working around water; second, it publicizes those who, because of a near miss with death, can be the most effective spokesmen for the safety program. The program is called the Smart Duck Club.

Sponsorship of the club is open to any maritime industry employer who requires the wearing of Coast Guard approved workvests by his employees when they are exposed to the danger of falling overboard. All sponsoring member companies receive a beautiful membership certificate to hang in their place of business. Additional sponsoring member certificates are also available to be placed upon company vessels.

Actual membership in the club is open to any employee who, recognizing the potential for danger on the job, wore a Coast Guard approved work vest and thereby avoided death by drowning during an accidental entry into the water.

The club has come a long way since its first two inductees received certificates at the Water Resources Congress in February 1973. To date, 135

Continued on next page.....

SMART DUCK.....

more members have been admitted into the club. The following is a breakdown of the total membership by industries:

Inland towing & fleeting	82
Chemical docks	13
Corps of Engineers	11
Dredging	7
Surveying	4
Barge & boat repair	9
Stevedoring	3
Midstream & fueling	2
Offshore towing & construction	2
Sand & gravel	1
U.S. Coast Guard	1
TOTAL	135

The members of the Inland Waterways Safety & Health Association and especially the club's two co-founders, Tony Accardo and Bill Fassler, are to be congratulated for development of this positive, results-oriented safety program for a very serious safety problem area. Of course, falls overboard are to be avoided if humanly possible, and it is therefore hoped that the Smart Duck Club membership remains small. But it is also hoped that every marine based company supports this worthwhile program within its operation, and that each person who is in danger of falling into the water while working is a prospective member because he wears a Coast Guard approved work vest. Make sure your employees can boast of being Smart Ducks and not dead ducks.

Further information regarding sponsoring membership for your company or employee memberships in the club can be obtained by writing the Inland Waterway Safety & Health Association, c/o Tony Accardo, 6149 Louisville Street, New Orleans, LA 70124.

The Smart Duck Club

As A Safety Minded Employee

JOSEPH MALLARD

is hearby registered in the Inland Waterway Safety and Health Association SMART DUCK CLUB. having earned his award by recognizing potential danger on the job and by having the foresight to wear a Coast Guard approved work vest which protected said employee from serious injury or possible death after falling in the water

Frank Fish
Company Representative

C. J. Accardo
Chairman, Smart Duck Club

XYZ BOAT COMPANY
Company

February 19, 1980
Date

Nautical Queries

The following items are examples of questions included in the Third Mate through Master deck examinations and the QMED examinations.

DECK

(1) The location of radio beacons is indicated on a chart by which of the following characteristics?

I. The abbreviation R Bn
II. The magenta circle around the location

A. I only
B. II only
C. Both I and II
D. Neither I nor II

(2) A buoy of the United States system having red and black horizontal bands would have a light characteristic of

A. group occulting.
B. interrupted quick flashing.
C. morse letter "A".
D. quick flashing.

(3) If a bearing taken to a known position of an object ashore is 320° by gyrocompass, and the charted bearing is 318° true, what course would you steer per gyrocompass to head directly toward the object?

A. 316°
B. 318.5°
C. 320°
D. 321.5°

(4) In the uniform cardinal system of buoyage, a buoy in the eastern quadrant from a danger could

A. be black and white horizontally striped.
B. be black and white vertically striped.
C. have a red top mark.
D. be any of the above.

(5) The equation of time is 12m 00s and the apparent sun is behind the mean sun. If you are 3° west of the central meridian of your time zone, what time will the apparent sun cross your meridian?

A. 1148
B. 1200
C. 1212
D. 1224

ENGINEER

(1) The emergency signal for fires is sounded on the ship's whistle and general alarm as

A. a continuous ringing for 10 seconds.
B. one short ring followed by one long ring.
C. two long rings of at least 20 seconds.
D. a continuous ringing until the fire is extinguished.

(2) If a person had received a severe electrical shock, but has fallen away from the electrical source and is still breathing, you should

A. give a stimulant to restore normal temperature.
B. keep the person lying down and warm.
C. apply cold compresses to any burned areas.
D. make the person stand up and walk around.

(3) Combustible gases or vapors can be safely detected with the

A. flame safety lamp.
B. combustible gas indicator.
C. halide torch.
D. orsat apparatus.

(4) If the fixed carbon dioxide fire extinguishing system for the paint locker suddenly discharges while you are in that compartment, you should immediately

A. drop to the deck to obtain oxygen.
B. leave that compartment for your own safety.
C. stop the ventilation and close the door.
D. look for the source of the fire.

(5) If the safety valve starts to whistle on an oxygen-breathing apparatus, the person wearing the OBA should

A. go out into the fresh air.
B. open the by-pass valve wide.
C. close the by-pass valve until the whistling stops.
D. reset the timer for an additional 10 minutes.

ANSWERS

Deck
1. C; 2. B; 3. C; 4. C; 5. D

Engineer
1. A; 2. B; 3. B; 4. B; 5. A

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications may be obtained from the nearest marine safety office, marine inspection office or by writing: **Commandant (G-CMA/TP26), U.S. Coast Guard, Washington, DC 20593.** Because changes to the rules and regulations are made from time to time, these publications can be kept current between revisions only by referring to the Federal Register. (Official changes to all Coast Guard authored federal regulations are published as final rules in the Federal Register on Mondays or Thursdays.) Following the title of each publication in the table below are the dates of the most recent editions and changes, if any.

The Federal Register may be obtained by subscription ($5 per month or $50 per year) or by individual copy (75 cents each) from SupDocs, U.S. Government Printing Office, Washington, DC 20402.

CG No. — TITLE OF PUBLICATION

NOTE: This is a newly revised list; please check carefully for changes.

CG-101-1 Specimen Examinations for Merchant Marine Deck Officers (2nd and 3rd Mate) (4-1-77).
CG-101-2 Specimen Examinations for Merchant Marine Deck Officers (Master and Chief Mate) (7-1-78).
CG-108 Rules and Regulations for Military Explosives and Hazardous Munitions (4-1-72). FR 7-21-72, 12-1-72, 6-18-75, 9-26-77.
CG-115 Marine Engineering Regulations (8-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78, 3-12-79, 5-3-79, 2 19 80.
CG-123 Rules and Regulations for Tank Vessels (8-1-77). Ch-1, 4-78. FR 1-3-77, 8-18-77, 9-12-77, 9-26-77, 9-29-77, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79, 11-19-79, 12-27-79, 1-31-80, 3 3 80.
CG-169 Navigation Rules - International - Inland (5-1-77). FR 7-11-77, 7-14-77, 9-26-77, 10-12-77, 11-3-77, 12-6-77, 12-15-77, 3-16-78.
CG-169-1 Colregs Demarcation Lines (7-15-77).
CG-172 Rules of the Road - Great Lakes (7-1-72). FR 10-6-72, 11-4-72, 1-16-73, 1-29-73, 5-9-73, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 1-13-77, 11-3-77, 12-6-77.
• CG-174 Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products (9-1-78).
CG-175 Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3-1-73).
•• CG-176 Load Line Regulations (2-1-71). FR 10-1-71, 5-10-73, 7-10-74, 10-14-75, 12-8-75, 1-8-76, 7-24-78.
CG-177 Yacht Admeasurement and Documentation (9-72).
CG-182-1 Specimen Examinations for Merchant Marine Engineers License (2nd and 3rd Assistant) (4-75).
CG-182-2 Specimen Examinations for Merchant Marine Engineer Licenses; First Assistant Engineer, Steam and Motor, any Horsepower (4-76).
CG-182-3 Specimen Examinations for Merchant Marine Engineer Licenses; Chief Engineer Steam and Motor, any Horsepower (4-76).
CG-184 Rules of the Road--Western Rivers (8-1-72). FR 9-12-72, 12-28-72, 3-8-74, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 3-1-76, 6-10-76, 7-11-77, 12-6-77, 12-15-77.
• CG-190 Equipment Lists (8-1-77).
CG-191 Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (11-1-78). FR 3-3-77, 5-16-77, 8-8-77, 4-9-79, 12-6-79.
CG-227 Laws Governing Marine Inspection (7-1-75).
CG-239 Security of Vessels and Waterfront Facilities (3-1-74). FR 5-15-74, 5-24-74, 8-15-74, 9-5-74, 9-9-74, 12-3-74, 1-6-75, 1-29-75, 4-22-75, 7-2-75, 7-7-75, 7-24-75, 10-1-75, 10-8-75, 6-3-76, 9-27-76, 2-3-77, 3-31-77, 7-14-77, 7-28-77, 9-22-77, 9-26-77, 12-19-77, 1-6-78, 1-16-78, 3-2-78, 11-16-78, 1-22-79, 1-25-79, 2-12-79, 11-5-79, 12-10-79, 1-31-80.
CG-242 International Conventions & Conferences on Marine Safety (8-51).
• CG-257 Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-77). Ch-1, 3-17-78. FR 1-31-77, 9-26-77, 9-29-77, 12-19-77, 10-10-78, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79.
CG-258 Rules and Regulations for Uninspected Vessels (4-77). FR 9-26-77, 9-29-77, 6-14-79, 7-2-79, 12-17-79, 2-4-80, 2-19-80.
CG-259 Electrical Engineering Regulations (7-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78.
CG-268 Rules and Regulations for Manning of Vessels (7-1-77). FR 11-19-79.
CG-293 Miscellaneous Electrical Equipment List (6-73).
CG-323 Rules and Regulations for Small Passenger Vessels (7-1-77). Ch-1 3-17-78. FR 9-26-77, 10-25-77, 12-15-77, 7-17-78, 3-12-79, 6-14-79, 7-2-79, 12-13-79, 2-19-80, 3-3-80.
CG-329 Fire Fighting Manual for Tank Vessels (1-1-74).
CG-388 Chemical Data Guide for Bulk Shipment by Water (1976).
CG-403 Great Lakes Pilotage Regulations (7-76).
CG-439 Bridge to Bridge Radiotelephone Communications (12-1-72). FR 12-28-72, 3-8-74, 5-5-75, 7-11-77.
CG-467 Specimen Examinations for Uninspected Towing Vessel Operators (10-1-74).
CG-474 When You Enter That Cargo Tank (3-76).
OLD CG-478, Liquefied Natural Gas and Liquefied Petroleum Gas, Views and Practices, Policy and Safety (3-80), now M16616.4.
CG-480 Oil Pollution Control for Tankermen (6-75).
CG-482 Benzene Safe Handling Practices (12-78).
CG-486 Shippers Guide to Hazardous Materials Regulations (Water Mode) (8-77).
CG-491 Safety for Small Passenger Vessels (8-77).
OLD CG-497, Rules and Regulations for Recreational Boating (12-78), now M 16752.3 (12-78) FR 7-19-79.
••• CG-515 Rules and Regulations for Foreign Vessels Operating in the Navigable Waters of the U.S. (2-78). FR 1976--7-8, 8-26, 9-16, 9-20, 12-13, 12-20. 1977--1-3, 5-16, 5-19, 6-16, 7-7, 7-14, 7-21, 7-25, 8-4, 8-11, 8-8, 9-12, 9-22, 9-26, 9-29, 11-10, 12-8, 12-15, 12-19. 1978--4-6, 5-18, 5-22, 6-29, 7-24, 8-10, 9-11, 9-25, 11-16, 11-20, 11-30, 12-7, 12-28. 1979--1-22, 1-25, 2-5, 2-12, 2-26, 3-29, 4-12, 4-16, 4-24, 5-3, 5-7, 5-31, 6-14, 6-21, 8-2, 8-16, 8-27, 9-4, 9-24, 10-15, 10-18, 11-1, 11-5, 11-19, 12-3, 12-10, 12-27. 1980--1-10, 1-31, 2-4, 2-19, 3-10, 3-20, 3-24, 3-31.
CG-518 Marine Investigating Officer's Regulations Handbook (2-78). FR 2-16-78, 4-27-78, 5-25-78, 6-15-78, 9-25-78, 10-19-78, 11-30-78, 1-25-79, 7-19-79, 9-4-79, 1-10-80, 2-11-80.
CG-526 Utilizing the Packaged Hazardous Materials Regulations, 49 CFR (5-78).
Safety of Life at Sea: Convention, with Regulations, London, June 17, 1960.
Specifications for Merchant Vessel Equipment (Subparts of Chapter Q, 46 CFR, parts 160 to 164.

•Temporarily out of stock
••Under revision--CG-176 text can be found in Title 46 CFR Parts 41-69
•••Available only through the Superintendent of Documents
••••Cancelled

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Vol. 37, No. 6

June/July 1980

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PROCEEDINGS
OF THE MARINE SAFETY COUNCIL

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Commandant

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Deputy Executive Secretary

Babs B. Eason
Editor

THIS COPY FOR NOT LESS THAN 20 READERS— PLEASE PASS IT ALONG

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cover

U.S. Merchant Marine Academy midshipmen have the opportunity for "hands on" training, both at Kings Point and aboard ship during their sea year. However, classroom theory is just as important as practical training at the U.S. Merchant Marine Academy, with each midshipmen qualifying for a bachelor of science degree, a merchant marine license, and a naval reserve commission at the end of Kings Point's four-year college program. More about the Academy begins on page 124.

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maritime sidelights

PROCEEDINGS EDITOR RESIGNS

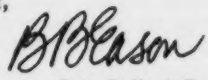
They say that all good things must come to an end—so ends my service as Proceedings editor. The past two years have been a truly broadening experience for me. Upon accepting this position, I soon discovered that I had more than a job—I had a unique opportunity to learn about the marine industry first hand. More importantly, I had the enviable opportunity to meet and work with some of the finest professionals in both industry and the Coast Guard. This experience has been invaluable in increasing my understanding of the role of the Coast Guard and its relationship to the marine industry. That's important, for my affiliation with the Coast Guard—and, I hope, with industry as well—doesn't end with my resignation as editor. I am leaving because my husband, a Coast Guard lieutenant, has been assigned to the Marine Safety Office in San Francisco.

Regretfully, Proceedings production must halt (temporarily, I hope) until a new editor can be selected. The Federal hiring freeze has complicated that action for the time being, so there could be quite a delay. I know, however, that my eventual replacement will appreciate your encouragement and input so please don't forget us!

Meanwhile, information on regulations, publications, etc. is still available from the Marine Safety Council. Write: Commandant (G-CMC/24), U.S. Coast Guard Headquarters, Washington, DC 20593, or call (202) 426-1477.

It's been a pleasure serving you.

Signing off,



Babs Beliech Eason

CG HEADQUARTERS ESTABLISHES NEW OFFICE OF NAVIGATION

The Commandant of the Coast Guard ordered a reorganization at Headquarters to create the new Office of Navigation, officially established May 1, 1980. Under RADM Richard A. Bauman, the new office has responsibility for lights, buoys, day beacons, private aids to navigation, all Loran networks and monitoring stations, Omega stations and radio beacons. Bridge permits and enforcement of laws and regulations on bridge construction and maintenance also comes under the new office's purview.

NATIONAL MARITIME LIABILITIES CONFERENCE

The 1980 National Conference on Developments in Maritime Liabilities has been scheduled for September 28-30 at the Sheraton Palace Hotel, San Francisco, California. The conference is aimed at all segments of the maritime industry, including vessel builders, operators and designers, vessel component suppliers, attorneys, insurance interests, cargo adjusters and labor representatives.

Conference registration is managed by Fisher Maritime Transportation Counselors, 50 South Orange Ave., South Orange, New Jersey 07079; (201) 763-4266.

PROPELLER CLUB ANNOUNCES 54TH CONVENTION/CONFERENCE

The Propeller Club of the United States is sponsoring the 54th Annual National Convention and the 1980 American Merchant Marine Conference, to be held this October 8, 9 and 10 in Seattle, Washington. Two local clubs, those of the Port of Seattle and the Port of Tacoma, will co-host the event. The conference, whose theme this year is "The American Merchant Marine—Shadow or Substance?" will be sited at the Washington Plaza Hotel in Seattle.

In addition, a pre-convention golf tournament is scheduled for Monday, October 6.

For more information, contact:

1980 Propeller Club Convention
217 Ninth Avenue N.
Seattle, WA 98109
(206) 624-9525

NATIONAL MARITIME ESSAY CONTEST WINNERS ANNOUNCED

The Propeller Club has awarded ship voyages and cash prizes to this year's winners of the annual National Maritime Essay Contest.

Twenty-one high school students have won trips on American ships, one a $500 cash prize, and one a $250 savings bond in the Harold Harding Memorial Essay Contest. The contest is dedicated to the memory of Harold Harding, National Secretary Treasurer of the Propeller Club of the United States from 1931 until his death in 1952.

The high school contest has been sponsored by the Propeller Club for over 45 years, in order to broaden the education of teenage students in maritime matters and to acquaint the younger generation with the necessity for a strong American Merchant Marine to ensure our national security and economic welfare. The theme for this year's contest was "Our Merchant Marine, Ocean, Great Lakes, and River Vessels - for Energy and Trade."

In addition, winners of the fourth annual Maritime Essay Contest for college students won prizes totaling $1,400.00. Four college students were selected to receive the cash prizes; four others won honorable mentions. Captain William Figari, National President of the Propeller Club, noted that "we have had a successful high school level essay contest for many years. This is only our fourth essay contest for college students. We hope that it will prosper and take a permanent place among the number of Propeller Club educational programs." The objectives of the college contest are to increase public awareness of U.S Merchant Marine and allied industries; illustrate the importance of our Merchant Marine to the military security and economic welfare of

Continued on next page.....

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our nation; reflect the dependence of our nation upon our inland and ocean-going marine industry; and stimulate interest in career opportunities in the field of marine transportation.

National awards with citations for both the high school and college level essay winners were presented on May 22 in connection with the observance of National Maritime Day.

The publication load for the month of May was exceptionally light. Aside from local rulemaking efforts (drawbridge regulations and safety zones), only 10 projects were published. These included three final rules, three proposed rules, one supplemental notice of proposed rulemaking and three notices.

The following final rules were published in the Federal Register within the past month. CGD 79-141, Carriage of Unslaked Lime, appeared on 12 May 1980 and CGD 79-027, Safety Approval of Cargo Containers, was published on 2 June. The third final rule, CGD 80-063, designating Anchorage, Alaska as a port of documentation, appeared on 5 June. Three notices were also published. These were CGD 79-126, Proposals for Exemption from Segregated Ballast Tanks, Clean Ballast Tanks and Crude Oil Washing Requirements, which was published on 22 May 1980 and two recreational boating standards, CGD 80-46, Fuel Systems Standards, and CGD 80-047, Electrical Systems Standards, which were published on 5 June 1980. In addition to these, one supplemental notice of proposed rulemaking and three notices appeared. The Supplemental Notice published on 27 May concerned the rulemaking on Stowage of Lifeboat and Liferafts, CGD 79-072. The three notices were published on separate dates. The first, CGD 80-034, published in the 27 May Federal Register, announced the appearance of a Loran C overprint chart. The second, 80-039, which appeared on 29 May, is a notice of Coast Guard approved equipment. The third is a notice that the authority to determine unsafe voyages has been delegated from the district commanders to field unit commanding officers.

Any questions regarding regulatory dockets or companies and individuals wishing to speak at public hearings should notify Mr. Bruce P. Novak (G-CMC/24), U.S. Coast Guard Headquarters, 2100 Second St. SW, Washington, DC 20593; (202)426-1477.

* * *

REVISION OF ELECTRICAL REGULATIONS
CGD 74-125(A)

This regulation will constitute a general revision and updating of the electrical regulations to conform with latest technology. It will include steering requirements for vessels other than tank vessels.

This revision is occurring because industrial standards for electrical engineering have changed in the past few years, and the regulations must be brought up to date to reflect current industry practices.

An initial NPRM was published on 27 June, 1977 (42 FR 32700). A supplemental NPRM was published as CGD 74-125A on 3 March, 1980 (Part VII).

NEW TANK
BARGE CONSTRUCTION
CGD 75-083
UPGRADE OF EXISTING TANK
BARGE CONSTRUCTION
CGD 75-083a

This action is comprised of two regulatory projects centered on tank barge construction standards. These projects were the result of a Presidential initiative of 17 March 1977, directing a study of the tank barge pollution problem. One project will address new barge construction while the other will pertain to existing barges. Regulatory documents for both will be published at the same time and joint public hearings have been held.

In July 1977, the Coast Guard began a reexamination of the tank barge construction standards. It was determined that new construction would be treated separately from existing barges. An advance notice of proposed rulemaking (ANPRM) was then issued to gather additional data and assess impacts related to existing barges.

The new NPRM on tank barge construction, withdrawing the prior NPRM and the ANPRM for existing tank barges, was published as part VI of the 14 June 1979 Federal Register (44 FR 34440 and 44 FR 34443, respectively).

Public hearings were held on the dockets as follows: 2 August 1979, Washington, DC; 15 August 1979, Seattle, WA; 23 August 1979, New Orleans, LA; 5 September 1979, Washington, DC; and 7 September 1979, St. Louis, MO. The comments given at the hearings have been incorporated in the docket.

On Thursday, 8 November 1979 a Federal Register notice extended the comment period on the project. This extension was based on the continued public interest and ran to 1 December 1979.

A Supplementary Notice was published as Part III of the 13 March 1980 Federal Register (44 FR 16438). This notice informs the public of a deferment in the rulemaking process for these dockets. The comments received have raised significant questions concerning these proposals. It was decided that the entire tank barge pollution problem warranted a carefully considered study by a recognized independent body. The National Academy of Sciences/-National Research Council will conduct the study. Part of the study, a two day workshop, was held on 15 and 16 April 1980. The study will be completed by the end of January 1981. The Coast Guard will defer any further rulemaking on these proposals until completion of the study and the dates in the proposals of 14 June 1979 are no longer valid. If the Coast Guard should pursue further action on these proposals, a new time table will have to be developed.

Continued on next page.....

Anyone wishing to obtain copies of the rulemaking may do so by contacting Mr. Bruce P. Novak, Marine Safety Council (address is given in the introduction to the Keynotes section).

POLLUTION PREVENTION, VESSELS AND OIL TRANSFER REGULATIONS CGD 75-124a

This regulation would reduce accidental or intentional discharge of oil or oily wastes during vessel operations.

The basis of this regulation is threefold. First, there is the need to reduce the number and incidence of oil spills. Second, this regulation will help to clarify the existing rules. Finally, this regulation covers the additional requirement for oil-water separators under the 1973 International Convention for the Prevention of Pollution from Ships.

An NPRM was published on 27 June 1977 (42 FR 32670) and a supplemental NPRM was published 27 October 1977 (42 FR 56625). Due to substantive changes in the regulation, a new NPRM is scheduled for July 1980.

SEGREGATED BALLAST AND TANK CLEANING REGULATIONS GCD 77-058(b)

This regulation was initiated when President Carter directed the Secretary of Transportation to issue new rules for oil tanker standards, which were to include segregated ballast on all tankers and double bottoms on all new tankers which call at American ports. The provisions of these proposed regulations have been changed by the February 1978 Intergovernmental Maritime Consultative Organization (IMCO) Conference to include Crude Oil Washing (COW) and Clean Ballast Tanks (CBT).

The NPRM was published 16 May 1977 (42 FR 24868). As a result of the IMCO Tanker and Pollution Prevention Conference of February 1978, a new NPRM was issued on 12 February 1979 (44 FR 8984). Public hearings were then held in March in Washington, DC and San Francisco, CA; 265 comments were received on the docket and analyzed. The final rules are scheduled to appear in July 1980.

CONSTRUCTION AND EQUIPMENT EXISTING SELF-PROPELLED VESSELS CARRYING BULK LIQUEFIED GASES CGD 77-069

These regulations would amend the current ones to include the substantive requirements of the "Code for Existing Ships Carrying Liquefied Gases in Bulk," adopted by the Intergovernmental Maritime Consultative Organization (IMCO). The use of liquefied gas has increased, as have the problems associated with it. Due to its unique properties and the dangers associated with them, new regulations are being drafted. The environmental impact statement and regulatory analysis were completed in February 1979 and an ANPRM on these regulations is anticipated in September 1980.

LICENSING OF PILOTS CGD 77-084

This regulation takes into account the problems caused by increased ship size and unusual maneuvering characteristics. The proposal would require recency of service for each route upon which a pilot is authorized to serve, licensing with tonnage limitations commensurate with pilot experience, and consideration of ship-handling simulator training for pilots of very large vessels. A regulatory analysis and work plan were completed in October 1978. An NPRM should be published by the printing of this issue.

REVISION OF 46 CFR 157.20-5 DIVISION INTO THREE WATCH REGULATION CGD 78-037

This revision would have required an adjustment in vessel manning requirements, to bring them in line with current legislation. It would change the requirements which identify personnel who must be used on the three watches and personnel who may be employed in a day working status. An NPRM formerly scheduled to be published on this docket in January 1980 has been deferred pending legislative action in Congress.

TANK VESSEL OPERATIONS REGULATIONS, PUGET SOUND CGD 78-041

This regulation governs the operation of tank vessels in the Puget Sound area. It was initiated to reduce the possibility of environmental harm resulting from oil spills in Puget Sound. This is to be accomplished by governing the operation of tankers and reducing the risk of collision or grounding.

Former Secretary of Transportation Brock Adams signed a 180-day Interim Rule on 14 March 1978 prohibiting entry of oil tankers in excess of 125,000 deadweight tons in Puget Sound; this appeared in the Federal Register of 23 March 1978 (43 FR 12257). An ANPRM was published 27 March 1978 (43 FR 12840). An extension of the interim rule was published in the Federal Register in order to allow the Coast Guard adequate time to complete this rulemaking.

The public hearings scheduled 11 and 12 June in Seattle, Washington, 13 June in Mt. Vernon, Washington, and 14 June in Port Angeles, Washington have been completed and all the comments received have been entered in the docket files for consideration. The extension of the interim navigation rule was published 21 June 1979 (44 FR 36174). This extension was effective 1 July and will be in effect until the Coast Guard prints notice of its cancellation. Copies of documents or the transcripts of the hearings may be obtained by writing to the Marine Safety Council. A final rule on the docket is currently expected in December 1981.

EIGHT-HOUR DAY VOLUNTARY OVERTIME CGD 78-146

This docket is a review of the Eight Hour Day, Voluntary Overtime regulation in 46 CFR 157.20-10, which states that no licensed officer should be required to be on duty more than eight hours per day except in extraordinary circumstances. Existing regulations, how-

Continued on next page.....

ever, do not address overtime or consider any possible "fatigue factor." Recent Coast Guard studies have shown that this factor has a profound effect on reaction time and judgement, therefore the regulatory project has been withdrawn.

PERSONNEL JOB SAFETY REQUIREMENTS FOR FIXED INSTALLATIONS ON THE OUTER CONTINENTAL SHELF CGD 79-077

This regulation is concerned with the health and safety requirements for installations engaged in oil field exploration and development. This action was mandated by pending Outer Continental Shelf legislation. It will provide more comprehensive protection for personnel employed in vessels and installations in the oil trade. The work plan received by the Marine Safety Council (MSC) in early July calls for an NPRM in March 1980.

QUALIFICATIONS OF THE PERSON IN CHARGE OF OIL TRANSFER OPERATIONS, TANKERMAN REQUIREMENTS CGD 79-116 and 79-116A

These regulations will redefine and establish qualifying criteria for the certifying of individuals engaged in the carriage and transfer of dangerous cargoes in bulk.

In has been found that most pollution incidents are the result of personnel error; consequently, the minimum qualifications of persons involved in handling polluting substances should be specified.

As stated in the last issue, these projects have been withdrawn (44 FR 25243). New notices of proposed rulemaking NPRM's) which were anticipated in June have been delayed and are now scheduled for publication in July.

SHIPBOARD NOISE ABATEMENT STANDARDS CGD 79-134

These standards will establish acceptable sound levels for each of the various vessel compartments based on the latest technology. The standards will differentiate acceptable sound levels for both existing vessels and new vessels, acceptable methods of compliance, and will establish a hearing conservation program.

During the development of these standards, the U.S. Naval Ocean Systems Center (NOSC), San Diego, California was contracted by the Coast Guard to evaluate sound levels aboard several U.S. merchant vessels, to study the data obtained, and then to define the extent of the noise problem. Based on this data and other information available, they were asked to recommend a set of noise levels to be used in the control and/or elimination of the shipboard noise problem for the proposed standards.

This study has been completed. Copies are available through the National Technical Information Service (NTIS), Springfield, Virginia 22161; request NOSC technical documents numbers 243, 254, 257, 267 and 405.

PERSONNEL AND MANNING STANDARDS FOR FOREIGN VESSELS CGD 79-081(A)

This regulation, deemed necessary to reduce the probability of oil spills, would establish minimum manning levels for foreign tank vessels operating in U.S. navigable waters. It would also establish procedures for the verification of training, qualification and watchkeeping standards. Interim final rules were published on 7 April 1977 (45 FR 23425).

PERSONNEL SAFETY AND HEALTH REQUIREMENTS FOR INDUSTRIAL VESSELS CGD 80-15

Similar to 79-077, this regulation covers the vessels engaged in exploration, supply and support on the Outer Continental Shelf (OCS). Mandated by pending OCS legislation, this project covers the growing fleet of vessels which perform the variety of industrial functions involved in the exploration and development of offshore resources. The regulations, designed to provide a more comprehensive personnel protection, are scheduled for an advanced notice of proposed rulemaking (ANPRM) in October 1980.

REQUEST FOR PUBLIC COMMENTS ON COAST GUARD DRAFT CONSUMER AFFAIRS PROGRAM CGD 80-062

The Coast Guard published notice of its Draft Consumer Affairs Program in the Federal Register on 9 June, 1980 (Vol. 45, No. 112, pages 39192-39196).

The purpose of that notice is to describe a Consumer Affairs Program that the Coast Guard proposes to implement to comply with Executive Order 12160 of 26 September 1979 (44 FR 55787-55790) and DOT's Consumer Program (45 FR 39144-39160) published in the Federal Register on 9 June 1980.

The Coast Guard Draft Consumer Affairs Program will be available for public comments through 8 August 1980. After review of public comments, the Coast Guard will revise, as appropriate, its draft program so that a final program may be published in the Federal Register by 31 October 1980, with implementation planned for 1 December 1980. This publication will cover the five main functions identified in the Executive Order. They are: Consumer Affairs Perspective, Consumer Participation, Information Materials, Education and Training, and Complaint Handling.

The Coast Guard looks forward to receiving public comments on additional ways that it might improve its consumer and citizen participation efforts.

For additional information or to request a copy of the Coast Guard Draft Consumer Affairs Program, as published in the Federal Register, contact: Consumer Affairs Officer, U.S. Coast Guard Headquarters, 2100 Second Street, SW., Washington, DC 20593; or telephone (202) 426-2290.

Comments must be received by 8 August 1980.

* * *

A complete listing of all Coast Guard proposed regulations, both "significant" and "non-significant," appeared in the Thursday, February 22, 1980 Federal Register (45 FR 13312).

TOXIC HAZARD AWARENESS IN RESPONSE TO HAZARDOUS MATERIALS SPILLS

By Lieutenant Thomas J. Haas
Cargo and Hazardous Materials Division
U.S. Coast Guard Headquarters, Washington, DC

This paper was presented to the 1980 National Conference and Exhibition on the Control of Hazardous Material Spills. The conference, held May 13-15, 1980 in Louisville, Kentucky, attracted over 900 attendees.

INTRODUCTION

Chemicals in an uncontrolled release into the environment can pose many hazards to the immediate area and the personnel responding to a spill. These hazards include possible fire and explosion, chemical reactivity, and adverse health effects. The assessment of the adverse health effects of chemical exposures is within the realm of **toxicology.** Few of the individuals involved with responding to hazardous material spills have received any formal training in this field yet its value to them becomes increasingly important as more exotic materials are involved in transportation accidents.

This paper is designed to familiarize these individuals with the terminology and some of the fundamental principles of toxicology, thus enabling them to more competently evaluate the health effects of exposures to chemicals. The concepts of acute and chronic toxicity and dose/response are discussed, and the primary intoxication pathways are described.

KINDS OF TOXICITY

Toxicology is defined in Webster's as "a science that deals with poisons and their effect and with the problems involved (as clinical, industrial or legal)." A more meaningful approach is to describe toxicology as the study of the harmful action of chemicals on biologic mechanisms. Toxicology is a multi-disciplinary field which borrows freely from several basic sciences. A knowledge of physical, chemical, and biological concepts is a must. It also is dependent on fields such as physiology, statistics, pathology, and pharmacology.

Toxicity is the capacity of a substance to induce injury. Because it is a relative term, it becomes necessary to identify the site of action or specific organism in which the harmful effect is produced. For example, a chemical could be harmful or even lethal to the mosquito, but relatively harmless to man. Therefore, toxicity is a property of a particular substance, much like other properties such as heat of combustion or vapor pressure.

Hazard is the probability that a particular substance will and can induce an injury. Asbestos, for example, is assumed to be relatively safe if it is bound in a matrix, but when released into the air and inhaled, the fibers can cause the disease asbestosis, or even cancer.

Continued on next page.....

Generally, toxicity can be classified as either acute or chronic. **Acute toxicity** involves an exposure to a relatively high concentration of a material over a relatively short period of time. There is usually a short period (seconds, minutes, hours) of time between the exposure and the effect, making it much easier to relate the specific exposure and its effect. **Chronic toxicity** is characterized by exposure to relatively low concentrations of a substance over a relatively long period of time (months, years). There could be a long period of time between the exposure and the effect, making it much more difficult to relate the specific exposure and the specific effect.

Local and systemic toxicity should also be explained. **Local toxicity** refers to the local action of a toxic material on the skin, mucous membranes of the upper respiratory tract, or the eyes. **Systemic toxicity** concerns the action of a toxic substance when absorbed into the body (by inhalation, ingestion, or through the skin). A systemic toxic effect can be generalized, such as anemia, or can affect one particular site, such as the kidney or liver.

Individuals responding to hazardous materials accidents are primarily concerned with the acute toxicity of the materials involved. However, these people are becoming increasingly aware of the possible long-term effects of exposures to chronic toxic agents such as carcinogens, mutagens, and teratogens. A **carcinogen** is a substance that induces cancer from either an acute or chronic exposure; a **mutagen** is a substance that will induce a permanent, transmissible difference in the characteristics of an offspring from those of its parent; a **teratogen** is a substance that will produce a physical defect in a developing embryo. Substances other than those listed above may cause other chronic toxic effects directed at a specific organ or organ systems. For example, exposure to benzene could lead to blood abnormalities such as anemia. an interesting note is that in some sensitive individuals these effects, normally attributed to exposure to low concentrations over prolonged periods of time, could possibly result from just one exposure to a very high concentration of the material.

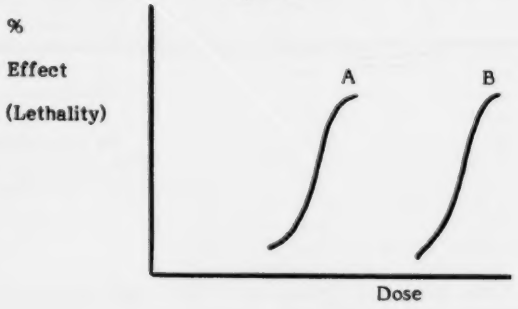
Inherent in the discussion of toxicity is the concept of dose. **Dose** is a function of the concentration of the substance to which an organism is exposed and the duration of the exposure. The most familiar term used to describe "dose" in industrial situations is the Threshold Limit Value (TLV). TLV's published by the American Conference of Governmental Industrial Hygienists (AGGIH) are time-weighted averages and are defined as "the concentration of a substance in air which can be breathed for five consecutive eight-hour work days (40 hour week) by most people without adverse effect."

The major concept relating chemical exposure (dose) and its effect is called the "dose/effect" potential. This is the single most important factor in determining the potential harmfulness of a chemical.

The graph in Figure 1 represents the conventional way to plot data which relate the dose or amount of substance with the cumulative percentage of animals showing a response (such as death). These plots are known as dose/response curves.

The curves are generated experimentally for a group of test animals, such as mice or rats, given a chemical substance by a certain route of administration (fed, inhaled, injected, etc.). The amounts given are chosen so that not all the animals will die or all of them survive. In subsequent groups of animals the amount would be increased by either a constant multiplier (x2) or logarithmically until all the animals in one of the groups die as a result of their exposure to the substance. For the majority of the time the curve is linear, showing that the incidence of death is directly related to the concentration of the chemical present. In the plot above, death or lethality is the effect (end point) and at the 50 percent cumulative level, the corresponding lethal dose can be defined. This point, commonly referred to as the LD_{50}, is the dose which produces death in 50 percent of the test animals and, therefore, serves as a specific reference point for the material.

Figure 1



If the LD_{50} for compound B is greater than that of compound A, compound B may be said to be less potent than compound A. Therefore potency (in terms of qualtity of substance) and toxicity (in terms of harmfulness) are both relative terms which are used only with reference to other substances. In an example from Loomis there is a great range of con centration or doses of chemicals that will produce harm or injurious effects.[1]

TABLE 1

Extremely toxic	(1mg/kg or less)
Highly toxic	(1 to 50 mg/kg)
Moderately toxic	(50 to 500 mg/kg)
Slightly toxic	(0.5 to 5 g/kg)
Practically non-toxic	(5 to 15 g/kg)
Relatively harmless	(more than 15 g/kg)

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Therefore, toxicity is a relative term and must be evaluated in light of the specific substance, amount of material present, and the possible effects of the substance upon the response personnel during an uncontrolled spill.

TOXIC SUBSTANCES AND THE BODY

In order to prevent injury from toxic materials it is essential that one have a clear understanding of how materials enter the body, distribute, and are eliminated. The physical, chemical, and physiological classifications of the materials are also important. These concepts, along with the toxicity evaluation must be utilized when determining the health risk to personnel involved in a hazardous materials spill.

There are four basic routes for a substance to enter the body: inhalation, skin/eye absorption, ingestion, and injection.

Inhalation is the primary route of exposure for volatile toxic substances and the one of primary concern for individuals responding to a hazardous chemical spill. The substance present in the atmosphere is inhaled and can either be deposited (absorbed into the mucous layer of the respiratory tract) or exhaled. Injury may occur by either the direct contact of the irritating or corrosive material on lung tissue, which produces local lesions, or absorption of the harmful substance into the blood through the lungs. Many factors play a role in this absorption including the solubility of the substance in body fluids, the permeability of the lungs, inhalation volume, volume of blood in the lungs, and the concentration gradient between the vapors present in the atmosphere and the blood.

From Figure 2, the respiratory system is composed of two main parts: the upper respiratory tract (nose, throat, trachea, and bronchus) and the lower respiratory tract (smaller bronchioles and alveoli, or air sacs). If particulate material, gases, or vapors are not trapped in the upper respiratory tract, local injury deep in the lung or absorption of the harmful material into the blood will occur.

Skin eye contact and absorption is a very common route of exposure in spill response activities. Direct contact with the skin can result in dermatitis, a general term describing any inflammation of the skin. The effects on the skin can be severe enough to actually destroy skin tissue or just produce mild irritancy or redness which disappears quickly after the contact. Contact with certain substances, such as solvents (trichloroethylene, acetone, etc.), can remove the skin's natural oils, leaving the skin dry and subject to cracking and possible infection.

Some materials can produce systemic toxicity through direct contact with the skin. Many organic materials can cross the skin barrier and be absorbed into the blood because of the substance's fat solubility. Some examples are organo-cyanides, aromatic amines, phenol, and organophosphate insecticides.

The eye is a very sensitive route of exposure. The eye does have the protective mechanism, tearing, which can dilute and remove an irritating or corrosive material. However, if this mechanism is overloaded by a very strong irritating or corrosive material, even for just a few seconds, serious injury can occur.

Ingestion is the most common, non-industrial route of exposure for a material to be absorbed into the body. In some industrial settings, through sloppy work practices or carelessness, an individual can ingest a

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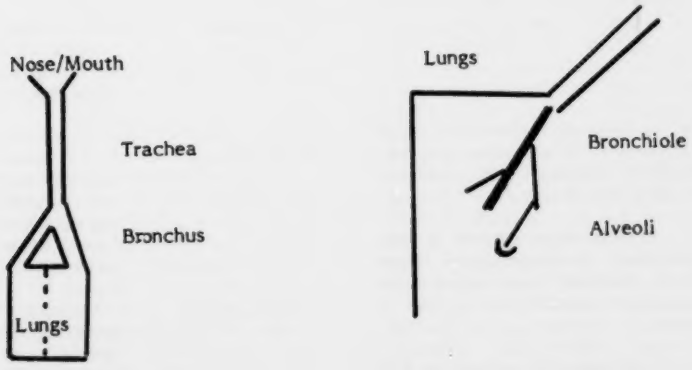
Figure 2



toxic material. One a substance has entered the G-I tract it can either be absorbed or excreted, unchanged. It can also be metabolized to a more/less toxic substance and then absorbed or excreted. The metabolism of the chemical generally leads to a more water soluble product and a quicker removal from the body.

Injection is a very rare route of exposure during a spill, but may occur if an individual's skin is punctured by metal debris coated with the toxic material.

Once a substance is absorbed into the body, the circulatory systems (blood and lymph) can distribute it to different parts of the body where toxic effects can occur. The material during this transit may remain unchanged, be metabolized, or be stored.

The body can rid itself of a harmful substance through various mechanisms. If a gas or vapor enters the lungs it can be exhaled unchanged; particles can be entrapped in the mucous layer and either coughed out or swallowed. If a material is absorbed into the circulatory system through the lungs or G-I tract and then distributed, it can be metabolized by the liver or kidneys and excreted in the feces or urine. A stored material will usually be inactivated until released, however, with asbestos, asbestosis or even cancer may occur once the material is embedded in the lung.

The **physical classification** of a substance can affect how the material enters the body and, therefore, can affect the substance's actions. The two primary forms of a contaminant are gases/vapors and particulates. These are described in Table 2.

The **chemical classification** of a substance is based upon its chemical composition. This enables one to assign a specific commodity to "a group" of similar products. A detailed description of chemical groups is found in the **Chemical Data Guide for Bulk Shipment by Water (CG-388).** Some examples listed in CG-388 include organic acids, caustics, amides, aldehydes, phenols, halogenated hydrocarbons, and hydrocarbons.

The specific chemical properties of the substance are also important in determining the potential hazards. These include the vapor pressure, boiling point, melting point, and solubilities. These are also available in CG-388 and in the **Chemical Hazards Response Information System** (CHRIS).

Because inhalation is the primary route of exposure for spill response personnel, description of the **physiological classification** will be slanted in this direction.

It is very difficult to correctly place a material in a single physiological class because the type of physiological action depends upon concentration. For

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TABLE 2

Physical Classification[2]

1. Gases and Vapors
   - a. Gas - any material that is in a gaseous state at 25°C and 760 mm Hg.
   - b. Vapor - the gaseous phase of a substance ordinarily liquid or solid at 25°C and 760 mm Hg.
2. Particulate Matter
   - a. Aerosol - a dispersion of solid or liquid particles of microscopic size in a gaseous medium; for instance smoke, fog, or mist.
   - b. Dust - a loose term applied to solid particles predominantly larger than colloidal and capable of temporary suspension in air or gases.
   - c. Fog - a loose term applied to visible aerosols in which the dispersed phase is liquid; formation by condensation is implied.
   - d. Fume - solid particles generated by condensation from gaseous state, generally, after the volatilization from melted substances and the accompanied chemical reaction, such as oxidation.
   - e. Mist - a loose term applied to dispersion of liquid particles—many of which are large enough to be individually visible without visual aid.
   - f. Smog - a term derived from smoke and fog and applied to extensive atmospheric contamination by aerosols arising from a combination natural and man-made sources.
   - g. Smoke - small gas-borne particles resulting from incomplete combustion and consisting predominantly of carbon and other combustible materials.

instance, a vapor at one concentration may exert its principle action as an anesthetic, while at lower concentrations of the same material, the nervous system, blood-forming system, or some other body organ may be affected.

There are, however, some very general physiological classes of materials: irritants/corrosives, asphyxiants, anesthetics/narcotics, systemic toxicants, and material other than systemic poison.

Irritants/corrosives are **materials** that can inflame moist or mucous surfaces in the pulmonary system, skin, or eyes. The effects are essentially the same in test animals as in humans and the concentration is more significant than the exposure time.

Certain substances, such as acetaldehyde, ammonia, ethylene oxide, hydrogen chloride, and sulfur dioxide can affect the upper respiratory tract. Chlorine, fluorine, and ozone are substances that can affect the upper and the lower respiratory tract (lung tissue). Finally, irritants such as nitrogen dioxide and phosgene affect the terminal respiratory passages and alveoli.

Asphyxiants exert their effects by interfering with oxidation of lung tissues. This group can be subdivided into two types, simple and chemical.

Simple asphyxiants are physiologically inert gases that act principally by diluting the atmospheric oxygen below the partial pressure required to maintain sufficient saturation of the blood for normal tissue respiration. Some typical examples include carbon dioxide, ethane, helium, hydrogen, methane, and nitrogen.

Chemical asphyxiants, through chemical action, either prevent the blood from transporting oxygen from the lungs, or prevent normal oxygenation of the tissues even though the blood is well oxygenated. Some examples are:

Carbon monoxide: combines with hemoglobin;

Hydrogen cyanide: inhibits tissue oxidation by combining with cellular catalysts;

Aniline: combines with hemoglobin;

Nitrobenzene: combines with hemoglobin, lowers blood pressure;

Hydrogen sulfide: causes respiratory paralysis.

Anesthetics/narcotics exert their principle action as simple anesthesia without any serious systemic effects. Usually a depression of the central nervous system occurs, which is governed by the substance's partial pressure in the blood supply to the brain. Some examples include various ketones, alcohols, and esters.

Systemic toxicants cause injury to specific target sites within the body or damage an entire organ system leading to non-specific effects. Materials such as halogenated hydrocarbons can injure specific organs such as the heart, liver, or kidney. Other substances, such as benzene, phenols, and toluene, can damage the blood-forming system, causing anemia. Carbon disulfide, methyl alcohol, and organophosphate pesticides can affect the nervous system.

Finally, there is a possibility that **particulate material** could lead to systemic injury. Silica and asbestos can produce a general fibrosis of the lungs, mists of acids or alkalines can irritate and scar lung tissue, and inert dusts can physically inhibit the lungs' ability to oxygenate the blood supply.

CONCLUSION

This paper has attempted to familiarize those individuals responding to hazardous chemical spills with the terminology and fundamental principles of toxicology. By becoming aware of these concepts, personnel can better evaluate the hazards to life and health in order to protect themselves and the people around them.

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About the Author

Lieutenant Thomas J. Haas

Lt. Haas, a 1973 graduate of the Coast Guard Academy, received postgraduate training in chemistry and environmental health sciences (toxicology) from the University of Michigan. Since coming to the Cargo and Hazardous Materials Division at Coast Guard Headquarters, he has contributed to the *Proceedings* in addition to preparing articles for publication in other professional journals, such as the Journal of Veterinary and Human Toxicology. Recently, Lt. Haas has lectured on chemical hazards at the Coast Guard Reserve Training Center, Yorktown, Virginia and at the Maritime Institute of Technology and Advance Graduate Studies. He has also been instrumental in the developmental stages of a National Cancer Institute epidemiological study of Coast Guard marine inspectors, and is presently serving as secretary of the Chemical Transportation Advisory Committee's Subcommittee on Personal Protection and Chief of the Hazard Evaluation Branch at Coast Guard Headquarters.

THE UNITED STATES MERCHANT MARINE ACADEMY

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June / July 1980

The United States Merchant Marine Academy, familiarly known as Kings Point, is located about 20 miles east of New York City. The 76-acre campus overlooks the waters of Long Island Sound and provides a scenic as well as a practical location for maritime training.

One of the five federal service academies, Kings Point was dedicated in 1943 under the War Shipping Administration (the forerunner of the Maritime Administration of the Department of Commerce) in recognition of the national need for a body of well-trained merchant marine officers.

The Academy usually has about 1,100 men and women enrolled at any given time, and there is a full-time faculty of 83. Most graduates of the Academy become the officers that operate the vessels of the American Merchant Marine. Others serve in such capacities as ship designers (naval architects), maritime lawyers (admiralty law), port engineers, shipping company executives, naval officers, Coast Guard officers, and oceanographers.

HISTORY OF THE ACADEMY

The United States Merchant Marine Cadet Corps was established on March 15, 1938, following passage of the Merchant Marine Act of 1936. Training was first given aboard merchant ships and later at temporary shore establishments pending the acquisition of permanent facilities. The Walter P. Chrysler estate at Kings Point, New York, was selected as the permanent site for the Academy in March 1942, and construction was begun the following May. Fifteen months later the task was virtually completed and the United States Merchant Marine Academy was dedicated on September 30, 1943.

World War II required the Academy to forego normal operation and devote all of its resources toward meeting the emergency personnel needs of the merchant marine. The enrollment was increased to 2,700 and the planned course of instruction was reduced in length from 4 years to 24 months. By the end of the war, the Academy had graduated 6,634 officers.

Notwithstanding the war, shipboard training continued to be an integral part of the Academy curriculum, and midshipmen served at sea in combat zones the world over. Two hundred and twelve midshipmen and graduates gave their lives in service to their country and many others survived torpedoings and bombings.

In the closing days of World War II, plans were formulated to establish a college-level program to meet the peacetime needs of the merchant marine. At the end of the War, the four-year course was immediately instituted with the September 1945 class of midshipmen.

The Academy has since grown in stature and has become one of the world's foremost institutions in the field of maritime education. In 1949, authorization for awarding graduates the degree of Bachelor of Science was granted by the 81st Congress and the Academy was fully accredited as a degree-granting institution. The Academy was made a permanent institution by an Act of Congress on February 20, 1956, and its operation was placed under the authority of the Department of Commerce.

THE ACADEMY AND THE UNITED STATES NAVY

A strong relationship exists between the Academy and the U.S. Navy, which stems from the Navy's interest in well-trained merchant officers who will form a "fourth arm of defense" in times of national emergency. Each midshipman enrolled at Kings Point is also a midshipman in the relatively new Merchant Marine Reserve, U.S. Naval Reserve program (MMR, USNR) and receives instruction from U.S. Navy personnel stationed at the Academy, in addition to the regular curriculum.

After accepting an appointment as an Ensign in the MMR, USNR program, a graduate must perform satisfactorily in the Naval Reserve for six years. He or she may apply for and, if accepted, serve on full-time active duty as an officer in the Naval Service for three consecutive years. Any portion of the six-year period not served on active duty will be served on inactive duty.

ADMISSIONS REQUIREMENTS

Applicants to the Academy must:

--be graduates of an accredited high school, or the equivalent;

--be nominated by a member of Congress or other nominating authority;

--have had at least three years of English, three years of mathematics (algebra, geometry, and trigonometry) and one year of chemistry or physics with a laboratory during high school;

--be at least 17 and not have passed their 22nd birthday on July 1 of the year of admission. A waiver may be granted for veterans of the armed forces up to the age of 24;

--meet physical qualifications including visual and aural acuity requirements;

--be citizens of the U.S., by birth or naturalization.

Candidates are required to qualify on either the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board or the American College Testing Program's examination (ACT). Last year, the average candidate had an SAT verbal score of 520 and a mathematics score of 620 and ranked in the top 15 percent of his or her class. Candidates are selected competitively for the vacancies allocated to their state or geographic subdivision. Each state has a quota proportionate to its representation in Congress.

THE FOUR-YEAR PROGRAM

A midshipman at the United States Merchant Marine Academy receives a four-year scholarship--

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tuition, room and board, medical and dental care are all provided at government expense.

The newly appointed Plebes (freshmen) report to the Academy during the third week in July for two weeks of orientation prior to the beginning of classes in August. During the orientation program, and during most of the remainder of Plebe Year, the new midshipmen undergo an intensive program of regimental training and indoctrination.

All Plebes follow a common program of study for the first two quarters of the freshman year. During this period, in addition to basic courses in mathematics, science and the humanities, every midshipman takes introductory courses in nautical science and marine engineering. The new midshipman is thus given an opportunity to determine intelligently an area of special interest before choosing a major field of concentration.

Each midshipman, during half of the sophomore year and half of the junior year, serves five months at sea aboard commercially operated American-flag merchant vessels. This Shipboard Training Program is perhaps the most unusual and exciting part of the Academy curriculum. While aboard ship, in addition to shipboard duties, midshipmen are required to complete special written assignments in a wide variety of professional subjects. This unique work-study program takes them to many parts of the world and provides them with practical experience. Every effort is made to assign midshipmen to several different vessels during their two periods of training. They thereby become familiar with the performance and operating characteristics of various classes of ships and with the diverse operating requirements of different trade routes, while at the same time gaining valuable experience in the performance of shipboard duties. Between periods of shipboard training, each midshipman returns to the Academy and continues academic work in his chosen field.

Engineering midshipman works in the U.S. Merchant Marine Academy's modern diesel laboratory.

The sea tour is concluded with a two-week assignment ashore for internship training in a maritime-related activity. Depending upon a midshipman's field of specialty and his individual interests, he or she may be asigned to a steamship company, shipyard, ship repair facility, ship brokerage/chartering firm, stevedoring firm, surveyor's office, towing company, port and terminal facility, or similar enterprise.

The senior year is devoted to intensive study in the chosen major and preparation for the written examinations, administered by the United States Coast Guard, which lead to licensing as a Third Mate, Third Assistant Engineer, or Dual License officer.

To be eligible for graduation, a midshipman must pass all required courses, earn the minimum number of credit hours prescribed for his curriculum, attain a cumulative quality-point average of 2.00 (C), pass the appropriate USCG license examination, and apply for, and accept if offered, a commission in the USNR.

ACADEMY CURRICULUMS

Academy midshipmen can choose from three basic curriculums in preparation for maritime careers: Nautical Science for the preparation of deck officers, Marine Engineering for students interested in becoming engineering officers, and a combination of the two, a Dual License curriculum, which leads to a license in each specialty.

Courses are administered through eight departments, described briefly below.

The **Department of Nautical Science** offers introductory courses to familiarize students with the merchant marine and shipboard safety in general. Basic classes include Marine Safety, with particular emphasis on firefighting; Marine Materials Handling; Safety of Life at Sea; Marine Electronics; Seamanship; Navigation; Oceanography; and Small Vessel Operations. These same subjects are also dealt with in advanced classes, plus Microwave Techniques, Maritime Satellites Information System, Marine Instrument Developments, Basic Electronic Circuits and Devices, Electronic Circuits and Systems, Marine Electronics, Astronomy, Pollution Control, Meteorology, Offshore Oil Operations, Domestic Shipping, and Tanker Terminal Operations.

All midshipmen are required to take a program of naval science courses administered by the **Department of Naval Science.** The department is staffed by officers and men who are assigned to the Academy by the Department of the Navy. The Chief of Naval Education and Training prescribes the naval science curriculum and furnishes required textbooks, refer-

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Seventeen varsity sports, as well as a variety of intramural competition--enough sports for anyone--highlight the U.S. Merchant Marine Academy's physical education and athletic program.

ences, and training aids. Information covered includes Naval Weapons Systems, Naval Operations, and Naval Organization; the program is completed with an Advanced Naval Science Seminar.

The **Department of Engineering** offers basic and complex courses in Engineering Graphics, Marine Engineering, Electrical Engineering, Engineering Shop, Metal Cutting, Metal Joining, Computer Engineering, Small Vessel Engineering, Thermodynamics, Geometry, Priciples of Naval Architecture, Fluid Mechanics, Electric Circuits, Switching Theory, Computer Engineering, Management Systems, Computer Control Systems, Machine Design, Ship Resistance and Propulsion, Ship Structure and Dynamics, Basic Ship Design, Heat Transfer, Marine Refrigeration, Air Conditioning, AC/DC Machinery, Electronics, Internal Combustion Engines, Diesel Engine Maintenance, Gas Turbines, Thermal Systems Analysis, Automatic Control Systems, Ocean Engineering, Nuclear Engineering, Nuclear Ship Propulsion, and Engineering Economics.

The **Department of Humanities** teaches English and several modern foreign languages; national and world history; social and political sciences; and literature and drama. In addition, the department offers a special class on U.S. Maritime History.

The **Department of Maritime Law and Economics** offers programs that provide midshipmen with the background and professional competence needed to pursue an executive career in the shipping industry. Courses include Business Law, Maritime Law, International Law of the Sea, Economics, Marine Transportation, Accounting for Management, Seaport Management, Government and Business, Environmental Law, Admiralty Law, Law for Engineers and Scientists, Labor Relations, Marine Insurance, Ship Chartering and Brokerage, Personnel Administration and Supervision, International Trade and Finance, Personal Finance, and Industrial and General Psychology.

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The **Department of Mathematics and Science** offers a program of courses that can lead to a concentration in chemistry, mathematics, or physics. These include Trigonometry, Calculus and Analytic Geometry, Physics, General Chemistry, Probability, Statistics, Differential Equations, Operations Research, Nuclear and Atomic Physics, Oceanographic Chemistry, History and Philosophy of Science, Advanced Mathematics for Engineers, Solid State Physics, Physics of Solar Energy, Quantum Mechanics, Organic Chemistry, Biochemistry, and Astrophysics.

The **Department of Physical Education and Athletics** has a sport for every student. The Academy seeks to promote the growth of each midshipman as a whole person and is thus concerned with physical development as well as with development of character and intellect. Physical fitness and athletics are therefore an important part of Academy life.

The Academy fields varsity teams in 17 sports: baseball, basketball, bowling, crew, cross-country, golf, rifle, pistol, sailing, soccer, swimming, tennis, indoor track, outdoor track, football, volleyball, and wrestling. In addition, the intramural athletic program offers all midshipmen the opportunity to enjoy the benefits of competitive sports at a level appropriate to their athletic ability.

Kings Point is particularly proud of its Sailing Squadron. A fleet of 30 interclub dinghies and 15 420's provides intercollegiate sailing at its best. The squadron participates in frequent races on Long Island Sound using six 30-foot Shields sloops. Academy yachts, skippered by Academy midshipmen, have participated in the grueling Marblehead to Halifax race, the Annapolis to Newport and Bermuda races, and the Martha's Vineyard race. A collection of silver cups and trophies attests to the prowess of Academy sailors, who have been nationally ranked in the top 10 the past few years.

A program of particular interest to midshipmen is the Kings Point Scholar Program, in which selected midshipmen participate in special research projects of value to the maritime industry. This program is managed by the **Department of Interdisciplinary Studies.**

The Scholar Program is designed to provide an opportunity for highly qualified midshipmen to engage in independent study and guided research, in lieu of electives, during their First Class Year. The program is sponsored and funded by the National Maritime Research Center (NMRC) and administered by the Kings Point Scholar Committee. The National Maritime Research Center, under the direction of the Office of Commercial Development of the Maritime Administration, was established at the Academy in June 1971. The location of the center at the Academy enhances faculty research opportunities and enriches the educational program for Academy midshipmen through the infusion of state-of-the-art knowledge into the Academy's educational and research program.

Under the guidance and supervision of selected faculty, midshipmen in the program engage in self-directed study and research in an area of their own interest. Midshipmen submit reports on the results of their research to NMRC, which are published through the National Technical Information Service. The best Scholar paper of the year is eligible for an award.

The NMRC is proud to have one of the world's most advanced ship-operations simulator, a Computer-Aided Operations Research Facility (CAORF), equipped with an extensive computer bank. It has the capability of researching and solving problems in ship handling, collision avoidance, and other aspects of ship operations that take into account the equipment, the environment, the ship structure, and human factors. Another major research program at the center involves the use of satellites as an aid to communication and electronic navigation for the maritime industry. The center is also involved in many research programs relating to advanced ship operations, energy, economics, personnel studies of licensed merchant marine officers and unlicensed seamen, and the support of MarAd Headquarters projects.

CAREER OPPORTUNITIES

After graduation from the Academy, a newly licensed Third Mate or Third Assistant Engineer joins a ship as a fully qualified junior officer. He or she will be in charge of a watch, on the bridge or in the engine room, and will be responsible for the safety of the ship or its propulsion plant while on duty. After a year of shipboard experience, the examination for a Second Mate's or Second Assistant Engineer's license may be taken; then, after serving a year as "Second," the young officer is qualified to sit for the Chief Mate's or First Assistant Engineer's license. The final step, after additional service and experience, is to sit for the license of Master or Chief Engineer.

Upon graduation and Coast Guard licensing and with the recommendation of the Head of the Department of Naval Science and the Superintendent of the Academy, midshipmen are commissioned as Ensigns, Merchant Marine Reserve, United States Naval Reserve. This commissioning program, initiated in 1978, recognizes the special qualifications of licensed deck and engineering officers who are members of the Naval Reserve.

As an Ensign, USNR, the Academy graduate has an opportunity to apply for and serve on active duty in the Navy. Many graduates have remained in the Navy as career officers in surface ships, in submarines, and as aviators, in every rank from ensign to rear admiral. Similar career opportunities are available in the United States Coast Guard and in the National Oceanographic and Atmospheric Administration.

CONCLUSION

The major component of our nation's maritime industry is the United States merchant marine—the fleet of privately owned, American-flag vessels which transports goods, mail, and passengers to all ports of the world. But a strong maritime industry consists of more than oceangoing ships. It also includes large numbers of tugs, barges and river craft, steamship companies, ports and terminals, shipyards, marine insurance underwriters, ship chartering firms, admiralty lawyers, and a vast array of other special-

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ized firms directly or indirectly engaged in maritime-related commerce, engineering, research, and management endeavors.

For more than three decades, the U.S. Merchant Marine Academy has trained and graduated highly qualified individuals. Today, Kings Point graduates are serving with distinction in all sectors of the maritime industry. As merchant officers, shipping company executives, naval architects, admiralty lawyers, marine insurance underwriters, oceanographers, and career officers in the United States Navy and Coast Guard, Kings Point alumni continue to make significant contributions to the vital and exciting maritime industry.

Afloat and ashore, in private industry and public service, in civilian and military careers, Kings Pointers serve their nation well.

For more information concerning Kings Point, contact the Office of External Affairs, U.S. Merchant Marine Academy, Kings Point, NY 11024.

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This is the fourth in a series of articles on marine-related schools and organizations. The purpose of these articles is to familiarize readers with existing institutions, explaining exactly what they are and what they do, and who is eligible to join/attend.

If you would like to submit an article on a particular school or organization, please write to: Commandant (G-CMC/24), U.S. Coast Guard Headquarters, Washington, DC 20593 or call (202)426-1477.

Men and women at the U.S. Merchant Marine Academy participate in a military system of training and study, and receive Naval Science instruction in preparation for naval reserve commissioning at graduation.

Lessons from Casualties

At approximately 1800, on a clear and calm day early in January last year, a towing vessel and two tank barges were moored at an oil terminal dock on the Tennessee River. At about 0500, offloading 20,000 barrels of No. 6 oil commenced from one of the tank barges. At about 1000, the U.S. Coast Guard port safety inspector arrived and conducted a routine monitor of cargo transfer aboard the barge undergoing offloading and a spot-check aboard the second barge. He noted no discrepancies during the inspection, nor was he informed of any problems existing aboard either of the tank barges at that time.

At about 0500 the next day, pumping operations from the first tank barge were completed and the offloading of 20,000 barrels of No. 6 oil from the second tank barge commenced. Pumping of the product was slow due to the cold weather, even though both vessels were equipped with thermal fluid heaters to heat the thick product to a temperature of about 150 degrees F. At around 1750 that evening, when the product depth was about one foot in the No. 1 cargo tank, suction problems were encountered in the cargo suction line inside the tank. At that point, the chief engineer advised the captain of the problem and the two of them entered the No. 1 tank with a bed sheet torn into strips to wrap around the cargo pipe. They wore no masks or self-contained breathing apparatus of any type, nor was the oxygen level of the tank checked prior to their entry (equipment to do so was not available). After being in the tank about four minutes, they returned on deck to obtain another sheet. Neither showed any ill effects from being in the tank. After about 10 minutes, they reentered the tank with another sheet and had just started to wrap it around the pipe when the captain passed out. The chief engineer called for help, and two deck hands passed him a rope. He failed to secure the rope around the captain, called again for help, and a third man entered the tank. They succeeded in tying the rope around the unconscious man, but the chief engineer suddenly announced that he had to get out. He started for the ladder and then passed out at the bottom of it. At that point the third man also fell, unconscious, face down in the foot or so of oil remaining in the tank.

A radio call for assistance was intercepted by the U.S. Tennessee Valley Authority Public Safety Office. A three-man team of public safety officers was dispatched to assist, and arrived on the barge about 1830. All three men were removed from the tank within 40 minutes by the safety team, other crewmen, and dock personnel.

Upon arrival at a local hospital, the third tankerman was pronounced dead. The death certificate set forth the cause of death as "noxious fume inhalation." This was not concurred with in the Coast Guard investigation report, as the deceased was found face down in approximately one foot of No. 6 oil. He had probably been in that position in excess of 40 minutes, since it likely that he lost consciousness shortly after the first two men passed out. The report maintained that the most probable cause of death was due to drowning in the No. 6 oil.

The other two men were hospitalized with symptoms of anoxia, and released after about a week with no apparent after effects.

It is concluded that the proximate cause of this casualty was the unsafe act on the part of the captain and the chief engineer in entering a non-gas free compartment without first ascertaining if a sufficient oxygen level was available to sustain life.

The two survivors indicated that they were not aware of any dangers involved with tanks containing No. 6 oil and asphalt. Also, the captain stated that entering tanks containing No. 6 oil and asphalt was common practice in the "river industry." While there may not be an immediate danger from toxic gases in tanks containing No. 6 oil or asphalt, these cargoes contain hydrocarbons that displace oxygen in the tank. Tanks containing these cargoes should never be entered without testing the atmosphere in the tank for oxygen and flammable gases. Additionally, proper breathing apparatus should be available. A few minutes of preparation could have saved a man's life.

Marine Safety Council Membership

Rear Admiral Richard A. Bauman has recently been selected to serve as Chief of the newly-formed Office of Navigation at Coast Guard Headquarters, Washington, DC.

A native of Fitchburg, Massachusetts, Rear Admiral Bauman is a graduate of the Massachusetts Maritime Academy, Class of 1944. Following graduation, he sailed as a licensed deck officer in the U.S. Merchant Marine with wartime service on various Atlantic and Mediterranean convoys, including the invasion of Normandy. Following World War II, Rear Admiral Bauman remained in the Merchant Marine, receiving an unlimited Master's license in 1947.

Rear Admiral Bauman entered the U.S. Coast Guard in September 1957 under the provisions of Public Law 219, which provides for the appointment of licensed officers of the Merchant Marine as commissioned officers in the Coast Guard. His initial service as Operations Officer, Coast Guard Cutter CASCO, was followed by various assignments in the Coast Guard's Marine Safety Branch.

He returned to sea duty in 1965 as Executive Officer of the Coast Guard Cutter CHINCOTEAGUE, an ocean station vessel based at Norfolk, Virginia. He attended the Armed Forces Staff College at Norfolk, Virginia from August 1966 to January 1967, then was assigned to Coast Guard Squadron One, the squadron of 82-foot Coast Guard patrol cutters engaged in anti-infiltration patrols off the coast of Vietnam. Service as Chief Staff Officer of Squadron One was followed by command of Division Twelve of Squadron One, consisting of 13 cutters based at Da Nang, Vietnam.

Rear Admiral Bauman was awarded the Navy Commendation Medal with Combat "V" for action involving the destruction of an armed enemy trawler attempting to infiltrate arms and munitions into South Vietnam on the night of 29 February - 1 March 1968. For this action he was also awarded the Vietnamese Gallantry Cross with Gold Star by the Government of the Republic of Vietnam. He was awarded the Bronze Star Medal with Combat "V" for his service with Squadron One in Southeast Asia from March 1967 to April 1968.

Rear Admiral Bauman was assigned duties as the U.S. Coast Guard Liaison Officer to the Commander in Chief, U.S. Atlantic Fleet, U.S. Navy, at Norfolk, Virginia from June 1968 to February 1971. For this service, he was awarded the Joint Service Commendation Medal by the Atlantic Command.

From February 1971 through May 1973, Rear Admiral Bauman commanded the Norfolk-based Coast Guard Cutter INGHAM, which was engaged in North Atlantic Ocean weather station duties. He was awarded the Coast Guard Commendation Medal with Operational Distinguishing Device for his performance in that command.

The Admiral was next assigned as Chief of the Information Sytems Division at Coast Guard Headquarters. For this service he was awarded a Gold Star, in lieu of a Second Coast Guard Commendation Medal. He graduated from the National War College at Fort McNair, Washington, DC in June 1975. He then served as the Chief of Port Safety and Law Enforcement Division, Coast Guard Headquarters, for which he was awarded the Meritorious Service Medal. Prior to his present assignment, he was Chief of the Operations Division, Ninth Coast Guard District, Cleveland, Ohio, for which service he was awarded a Gold Star, in lieu of a third Coast Guard Commendation Medal.

Rear Admiral Bauman is married to the former Dorothy H. Schmalz of Fitchburg, Massachusetts. The Baumans have a married daughter and three sons, one of whom graduated from the U.S. Merchant Marine Academy at Kings Point, New York, and is now a ship's pilot on the Chesapeake Bay.

MIO NEW ORLEANS TAKES TO THE AIR

By Lieutenant P. T. Delaire

In addition to the more conventional forms of transportation used by past Coast Guard marine inspectors, a new breed of inspector from the Marine Inspection Office (MIO) New Orleans, Louisiana now flies to work on the Outer Continental Shelf of the Gulf of Mexico.

Utilizing three commercial helicopters leased through the Office of Aircraft Services, Department of Interior, these inspectors, along with others from marine inspection division (MIDET) Morgan City, Louisiana, fly daily into a 16,800 square mile area of the Gulf of Mexico between Mobile, Alabama and Lafayette, Louisiana. Their mission: to inspect, annually, approximately 1,860 artificial islands and fixed structures and 58 or so mobile offshore drilling units (MODU's) on the Outer Continental Shelf (OCS).

THE OUTER CONTINENTAL SHELF INSPECTION PROGRAM

Although the OCS program was originally established to inspect platforms, there is an increasing number of MODU's, submersible and semi-submersible drilling units, jack-up rigs, drill ships and posted drilling barges on the Gulf of Mexico. MIO New Orleans is responsible for inspecting the approximately 1,040 artificial islands located in South Pelto, South Timbalier, Grand Isle, West Delta, South Pass, Mississippi Canyon, Main Pass, Breton Sound, and Chandeleur Sound offshore leasing areas, and all of the MODU's in the entire New Orleans marine inspection zone. MIDET Morgan City annually inspects the remaining artificial islands located in South Marsh Island, Eugene Island, and Ship Shoal leasing areas.

MIO New Orleans is only one of the participants in the OCS Program in the Eighth Coast Guard District. Presently, there are five contract helicopters assigned to the OCS program. Two are located in New Orleans, one in Morgan City, and one in Port Arthur, with Galveston and Corpus Christi sharing the fifth.*

BACKGROUND OF THE OCS PROGRAM

Coast Guard activity in this program stems from the Outer Continental Shelf Lands Act of 1953, as amended by P.L. 95-372, which delegates to the U.S. Coast Guard the authority to promulgate and enforce regulations with respect to lights and other warning devices, safety equipment, and matters relating to the promotion of safety of life and property on the islands and structures of the Outer Continental Shelf. Coast Guard publication CG-320, entitled "Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf" (33 CFR 140-147 and 33 CFR 67), contains the requirements relating to the promotion of safety of life and property on the artificial islands and fixed structures of the Outer Continental Shelf. These regulations relate to, but are not limited to, inspection, construction and arrangement, lifesaving appliances, firefighting equipment, and operations.

While earlier Coast Guard policies called for an annual inspection of each platform and MODU, there was, in fact, very little activity due to the limited resources available for such inspections. For example, in 1977,

Continued on next page.....

The three Marine Safety Offices located in Texas are engaged in similar types of operations but on a smaller scale due to the lesser number of platforms and related oil field activities in their marine inspection zones. MSO Port Arthur uses their one leased helicopter to perform 470 offshore inspections annually and MSO Galveston conducts 140 platform and 25 mobile offshore drilling unit inspections in its offshore region. MSO Corpus Christi, which shares a leased helicopter with MSO Galveston, performs aproximately 25 annual inspections in its zone.

MIO NEW ORLEANS.....

only 48 platforms and 32 MODU's were inspected throughout the Coast Guard. These were inspected primarily by utilizing Coast Guard 210-foot medium endurance cutters and HH52 helicopters for transportation of inspectors. Additionally, there were the traditional investigative activities looking into the circumstances pertaining to deaths, serious injuries, and fires on OCS facilities.

With the passage of the OCS Lands Act Amendments in 1978, annual inspections became mandatory. MIO New Orleans was assigned its first helicopters in August 1978 and personnel were then dedicated full-time to offshore inspections. In 1979, MIO New Orleans alone inspected 1,040 platforms or artificial islands and 32 MODU's. Between 1 January 1980 and 1 May 1980, MIO New Orleans anticipated conducting an estimated 25 MODU inspections requiring approximately 300 man days (75 days utilizing 4 inspectors). Artificial islands in this zone are expected to number well over 1,900 by the year 1981.

OCS INSPECTOR TRAINING

The OCS Program has created a need for the Coast Guard marine inspector to learn new terms and to become familiar with new procedures; in short, to become more diversified.

Each OCS inspector attends the Eighth Coast Guard District Offshore Marine Inspectors School located on the campus of the University of Southwestern Louisiana, Lafayette, Louisiana. The course of instruction is divided into two phases. Phase one consists of two weeks of intensive classroom study dealing with such items as terminology, industrial safety, drilling tools, the drilling operation, operator/contractor relationship, cranes, helicopter safety, diving, American Petroleum Institute (API) standards, and USGS and USCG regulations. The second two-week phase involves actual on-site industry training where the inspector becomes familiar with the environment in which he will be working, including MODU and platform equipment, operations and industry problems, and offshore industrial personnel and their work schedules. It is intended that the inspector/trainee learn the terminology and develop a foundation for mutual understanding between industry and Coast Guard.

Minimum inspector qualification requirements have been established for OCS inspectors as follows:

a. Pre-OCS indoctrination of approximately one week with a qualified OCS inspector;

b. OCS school in Lafayette, Louisiana as described above;

c. Post-OCS school final qualification by a supervisory OCS inspector.

To supplement the OCS inspector training program, each MIO/MSO in the Eighth Coast Guard District has been supplied with a video tape player, TV monitor, and video training tapes that were produced by the Petroleum Extension Service of the University of Texas. In addition, a series of reading and study materials relating to offshore operations are available to the inspector for use in a home study program. Each qualified OCS inspector has attended the OCS School at Lafayette, Louisiana, has demonstrated a working knowledge of CG-320 and Vol. II, Chapter 38 of the Marine Safety Manual (MSM) and has conducted satisfactory inspections of both manned and unmanned platforms.

The OCS Program is escalating and is becoming more demanding on the OCS inspector to be qualified, not just on platforms, but also as a deck and engineer inspector. Utilizing the recommended check-off sheets referred to in the Marine Safety Manual, OCS inspectors fly offshore five days a week to ascertain the safety of personnel and property. Presently, an average week for the OCS Program at MIO New Orleans encompasses inspection of approximately 10 manned platforms, 40 unmanned platforms, and 3 or 4 MODU's. To meet the demand for increased inspection services, two additional helicopters have been scheduled for New Orleans this year.

OCS "COURTESY VISITS"

Offshore drilling is one means of helping provide present and future petroleum resources. In the interest of promoting safety in this expanding area of Coast Guard responsibility, MIO New Orleans is currently dispatching, as part of its OCS Program, a two-man boarding team to conduct "courtesy visits" to presently uncertificated MODU's. These Coast Guard representatives explain the regulations which will affect that rig when due for its initial inspection for certification. The intent of this program is to promote an understanding of the Coast Guard's new role involving the offshore oil industry. It is hoped that this cooperative effort will serve to alleviate possible future misunderstandings regarding regulations and enforcement policies.

About the Author

Lieutenant Paul T. DeLaire

Lieutenant DeLaire is a 1970 graduate of East Tennessee State University with a Bachelors Degree in Marketing. He enlisted in the Coast Guard in 1970 and was assigned to Naval Weapons Station Concord, California, as an Explosive Loading Supervisor. He later attended Aviation Electricians-mate School and was assigned to Coast Guard Air Station San Francisco, California.

Lieutenant DeLaire received his commission from Coast Guard Officer Candidate School in 1973. He was assigned to MSO Corpus Christi, Texas, from 1973 to 1977 where he served as an investigating officer, marine environmental protection officer, and port safety officer. He then was assigned to the USCGC UNIMAK in New Bedford, Massachusetts, which was involved in fisheries law enforcement. There he served as a deck watch officer and as first lieutenant. He is presently assigned to the Marine Inspection Office New Orleans, Louisiana, as a deck inspector. Previously, he worked in the Offshore Program inspecting artificial islands, platforms, and mobile offshore drilling units.

Nautical Queries

The following items are examples of questions included in the Third Mate through Master examinations and the Third Assistant Engineer through Chief Engineer examinations.

DECK

(1) U.S.C.G. approved buoyant work vests are considered to be items of safety equipment and may be worn by members of the crew

A. in lieu of life preservers during fire drills.
B. in lieu of life preservers during boat drills.
C. in lieu of life preservers during an actual emergency.
D. when working near or over the water under favorable working conditions.

REFERENCE: 46 CFR 35.03, 46 CFR 97.34-10

(2) The Master is responsible that each lifeboat is lowered to the water at least once in each

A. two months.
B. three months.
C. four months.
D. five months.

REFERENCE: 46 CFR 97.15-35(b)(6)

(3) Loran-C can be adversely affected by interference from many sources. To offset this, most manufacturers provide

A. tuneable filters.
B. pre-oscilloscope readings.
C. antenna wave length.
D. pre-tuned A and B phase.

REFERENCE: Bowditch 1977

(4) The basic principle on which Loran-C is based is referred to as

A. reflected electron system.
B. electrical radiation system.
C. quarterpoint electrical navigation.
D. hyperbolic radio navigation.

REFERENCE: Duttons 13th

(5) The Master of a vessel transporting hazardous materials or his authorized representative shall prepare a dangerous cargo manifest, list, or stowage plan. This must be kept

A. in the ship's office.
B. in a designated holder on or near the vessel's bridge.
C. in the master's office.
D. on the main deck near the gangway.

ENGINEER

(1) Heat exchanger tubes can be protected against erosion and abrasion by the use of

A. metallic packing on the inlet end.
B. fiber bushings in the ferrules.
C. zinc pencils on the waterside.
D. plastic tube end protectors.

REFERENCE: Osbourne

(2) When there is no movement of the rams on an electrohydraulic steering gear, the tilting box of the running pump is

A. set for maximum torque.
B. on the purge and vent stroke.
C. in the neutral position.
D. rotating backwards.

REFERENCE: Fluid Power

(3) According to Coast Guard regulations, how often shall internal combustion engine driven emergency generators be operated under load?

A. Once a week for two hours
B. Once a week for four hours
C. Once a month for two hours
D. Every six months for four hours

REFERENCE: 46 CFR 97.15-30(b)

(4) An insulating flange would be used in a cargo hose connection instead of a bonding wire

A. when pumping LNG only.
B. when static may be generated.
C. when the terminal is equipped with a cathodic protection system.
D. during cold weather.

REFERENCE: CG-174

(5) Four tugs on the lifeline by the wearer of an OBA means

A. Okay.
B. Advance.
C. Take Up.
D. Help.

REFERENCE: Oath - Marad Fire Fighting Manual

ANSWERS

Deck
1. D; 2. B; 3. A; 4. D; 5. B

Engineer
1. D; 2. C; 3. C; 4. C; 5. D

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications may be obtained from the nearest marine safety office, marine inspection office or by writing: **Commandant (G-CMA/TP26), U.S. Coast Guard, Washington, DC 20593.** Because changes to the rules and regulations are made from time to time, these publications can be kept current between revisions only by referring to the Federal Register. (Official changes to all Coast Guard authored federal regulations are published as final rules in the Federal Register on Mondays or Thursdays.) Following the title of each publication in the table below are the dates of the most recent editions and changes, if any.

The Federal Register may be obtained by subscription ($5 per month or $50 per year) or by individual copy (75 cents each) from SupDocs, U.S. Government Printing Office, Washington, DC 20402.

CG No.	TITLE OF PUBLICATION
	NOTE: This is a newly revised list; please check carefully for changes.
• CG-101-1	Specimen Examinations for Merchant Marine Deck Officers (2nd and 3rd Mate) (4-1-77).
CG-101-2	Specimen Examinations for Merchant Marine Deck Officers (Master and Chief Mate) (7-1-78).
CG-108	Rules and Regulations for Military Explosives and Hazardous Munitions (4-1-72). FR 7-21-72, 12-1-72, 6-18-75, 9-26-77.
CG-115	Marine Engineering Regulations (8-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78, 3-12-79, 5-3-79, 2 19 80.
CG-123	Rules and Regulations for Tank Vessels (8-1-77). Ch-1, 4-78. FR 1-3-77, 8-18-77, 9-12-77, 9-26-77, 9-29-77, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79, 11-19-79, 12-27-79, 1-31-80, 3 3 80.
CG-169	Navigation Rules - International - Inland (5-1-77). FR 7-11-77, 7-14-77, 9-26-77, 10-12-77, 11-3-77, 12-6-77, 12-15-77, 3-16-78.
CG-169-1	Colregs Demarcation Lines (7-15-77).
CG-172	Rules of the Road - Great Lakes (7-1-72). FR 10-6-72, 11-4-72, 1-16-73, 1-29-73, 5-8-73, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 1-13-77, 11-3-77, 12-6-77.
• CG-174	Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products (9-1-76).
• CG-175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3-1-73).
•• CG-176	Load Line Regulations (2-1-71). FR 10-1-71, 5-10-73, 7-10-74, 10-14-75, 12-8-75, 1-8-76, 7-24-78.
CG-177	Yacht Admeasurement and Documentation (9-72).
CG-182-1	Specimen Examinations for Merchant Marine Engineers License (2nd and 3rd Assistant) (4-75).
CG-182-2	Specimen Examinations for Merchant Marine Engineer Licenses; First Assistant Engineer, Steam and Motor, any Horsepower (4-76).
CG-182-3	Specimen Examinations for Merchant Marine Engineer Licenses; Chief Engineer Steam and Motor, any Horsepower (4-76).
CG-184	Rules of the Road--Western Rivers (8-1-72). FR 9-12-72, 12-28-72, 3-8-74, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 3-1-76, 6-10-76, 7-11-77, 12-6-77, 12-15-77.
• CG-190	Equipment Lists (8-1-77).
CG-191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (11-1-76). FR 3-3-77, 5-16-77, 8-8-77, 4-9-79, 12-6-79.
CG-227	Laws Governing Marine Inspection (7-1-75).
•••• CG-239	Security of Vessels and Waterfront Facilities (5-1-74). FR 5-15-74, 5-24-74, 8-15-74, 9-5-74, 9-9-74, 12-3-74, 1-6-75, 1-29-75, 4-22-75, 7-2-75, 7-7-75, 7-24-75, 10-1-75, 10-8-75, 6-3-76, 9-27-76, 2-3-77, 3-31-77, 7-14-77, 7-28-77, 9-22-77, 9-26-77, 12-19-77, 1-6-78, 1-16-78, 3-2-78, 11-16-78, 1-22-79, 1-25-79, 2-12-79, 11-5-79, 12-10-79, 1-31-80.
CG-242	International Conventions & Conferences on Marine Safety (6-51).
• CG-257	Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-77). Ch-1, 3-17-78. FR 1-31-77, 9-26-77, 9-29-77, 12-19-77, 10-10-78, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79.
CG-258	Rules and Regulations for Uninspected Vessels (4-77). FR 9-26-77, 9-29-77, 6-14-79, 7-2-79, 12-17-79, 2-4-80, 2-19-80.
CG-259	Electrical Engineering Regulations (7-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78.
CG-268	Rules and Regulations for Manning of Vessels (7-1-77). FR 11-19-79.
CG-293	Miscellaneous Electrical Equipment List (6-73).
CG-323	Rules and Regulations for Small Passenger Vessels (7-1-77). Ch-1 3-17-78. FR 9-26-77, 10-25-77, 12-15-77, 7-17-78, 3-12-79, 6-14-79, 7-2-79, 12-13-79, 2-19-80, 3-3-80.
CG-329	Fire Fighting Manual for Tank Vessels (1-1-74).
• CG-388	Chemical Data Guide for Bulk Shipment by Water (1976).
• CG-403	Great Lakes Pilotage Regulations (7-76).
CG-439	Bridge to Bridge Radiotelephone Communications (12-1-72). FR 12-28-72, 3-8-74, 5-5-75, 7-11-77.
• CG-467	Specimen Examinations for Uninspected Towing Vessel Operators (10-1-74).
CG-474	When You Enter That Cargo Tank (3-76).
OLD CG-478,	Liquefied Natural Gas and Liquefied Petroleum Gas, Views and Practices, Policy and Safety (3-80), now M16616.4.
CG-480	Oil Pollution Control for Tankermen (6-75).
CG-482	Benzene Safe Handling Practices (12-76).
CG-486	Shippers Guide to Hazardous Materials Regulations (Water Mode) (8-77).
CG-491	Safety for Small Passenger Vessels (8-77).
OLD CG-497,	Rules and Regulations for Recreational Boating (12-78), now M 16752.2 (12-78) FR 7-19-79.
••• CG-515	Rules and Regulations for Foreign Vessels Operating in the Navigable Waters of the U.S. (2-78). FR 1976--7-8, 8-26, 9-16, 9-20, 12-13, 12-20. 1977--1-3, 5-16, 5-19, 6-16, 7-7, 7-14, 7-21, 7-25, 8-4, 8-11, 8-8, 9-12, 9-22, 9-26, 9-29, 11-10, 12-8, 12-15, 12-19. 1978--4-6, 5-18, 5-22, 6-29, 7-24, 8-10, 9-11, 9-25, 11-16, 11-20, 11-30, 12-7, 12-28. 1979--1-22, 1-25, 2-5, 2-12, 2-26, 3-29, 4-12, 4-16, 4-24, 5-3, 5-7, 5-31, 6-14, 6-21, 8-2, 8-16, 8-27, 9-4, 9-24, 10-15, 10-18, 11-1, 11-5, 11-19, 12-3, 12-10, 12-27. 1980--1-10, 1-31, 2-4, 2-19, 3-10, 3-26, 3-24, 3-31.
CG-518	Marine Investigating Officer's Regulations Handbook (2-78). FR 2-16-78, 4-27-78, 5-25-78, 6-15-78, 9-25-78, 10-19-78, 11-20-78, 1-25-79, 7-19-79, 9-4-79, 1-10-80, 2-11-80.
• CG-526	Utilizing the Packaged Hazardous Materials Regulations, 49 CFR (5-78).
Safety of Life at Sea:	Convention, with Regulations, London, June 17, 1960.
Specifications for Merchant Vessel Equipment (Subparts of Chapter Q, 46 CFR, parts 160 to 164.	

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*Temporarily out of stock
**Under revision--CG-176 text can be found in Title 46 CFR Parts 41-69
***Available only through the Superintendent of Documents
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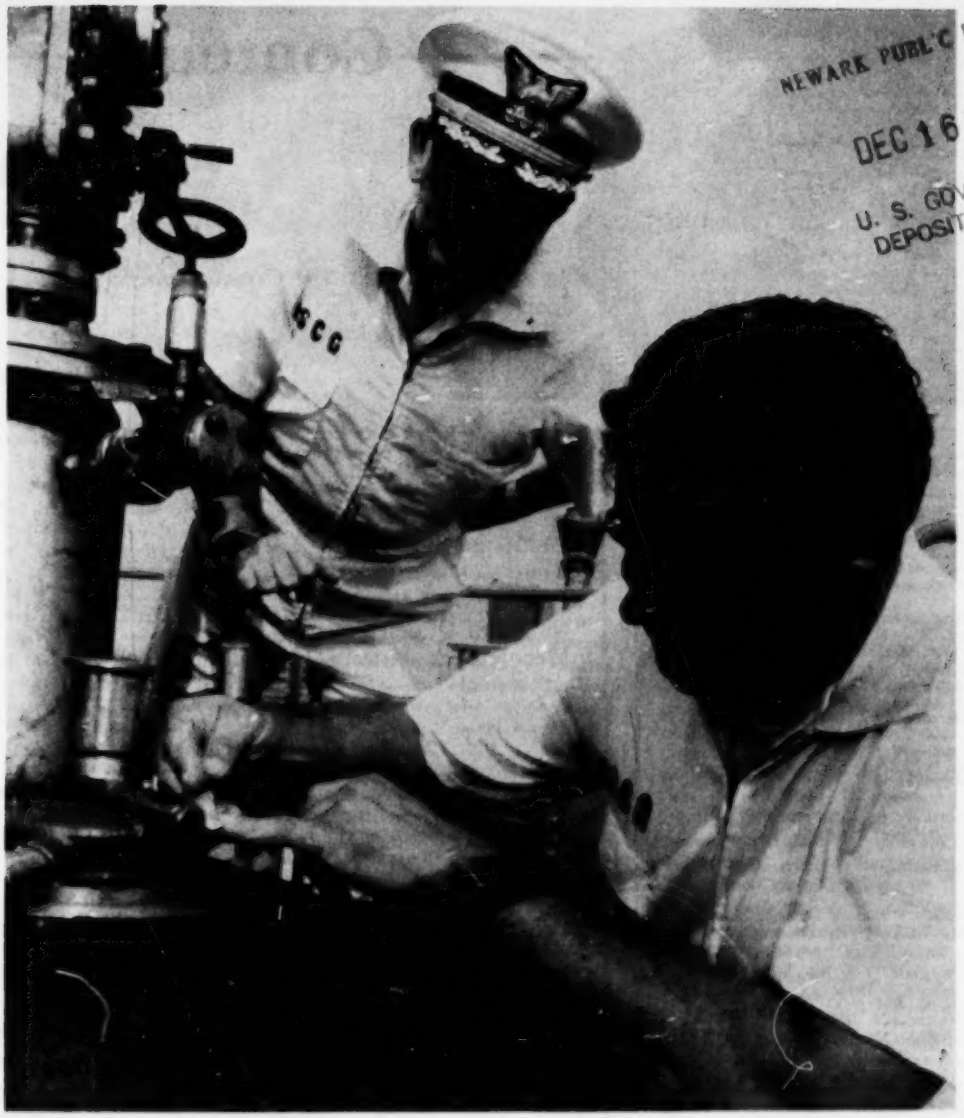

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cover

Captain Harold C. Carlton and CWO Chuck Brinson inspect equipment aboard the LNG carrier SS GOLAR FREEZE before allowing the ship to enter the Port of Savannah. For more on the Coast Guard's role in ensuring the safe offloading of LNG at Savannah's Elba Island facility, see the story beginning on page 144.

A letter from the (new) editor

As noted in the last issue (June/July 1980), the resignation of Editor Babs B. Eason forced a temporary halt in publication of the Proceedings. My appointment as new editor became effective September 22, 1980, and we are pleased to be able to resume publication with the present issue. You will notice a few changes in the appearance of the Proceedings as well as a new department: Chemical of the Month. "Anhydrous Ammonia" is the first in a series of sketches of bulk chemicals shipped by sea to be prepared by members of our Cargo and Hazardous Materials Division.

Although I have been on the job only a few weeks, I have already been impressed by the respect accorded the Coast Guard's work. I am proud to be a part of it and will do my best to serve you well. Thank you for your continuing interest during our lapse in publication and please do not hesitate to send me your comments and suggestions. Any input would be most appreciated.

Julie Steinhilber

New Executive Secretary Reports for Duty at Marine Safety Council

Commander Alfred D. Utara became the new Executive Secretary of the Marine Safety Council in July 1980. He replaces Captain Philip J. Danahy, who retired June 1 after 26 years of service with the Coast Guard.

In addition to heading the staff of the Marine Safety Council, the Executive Secretary serves as Regulations Officer for the Coast Guard. As such, he is responsible for seeing that the Coast Guard comply with all requirements of the legislative and executive branches of the government when issuing regulations.

Commander Utara is a 1961 graduate of the U.S. Coast Guard Academy in New London, Connecticut. He has been actively involved in marine safety since 1963, when he was assigned to the Marine Inspection Office in New York as an inspector/investigator. Following a stint as Executive Officer of the Marine Inspection Office in Miami, he served in the Merchant Vessel Inspection Division at Coast Guard Headquarters in Washington, D.C., after which he assumed the post of Deputy Chief, Marine Investigation, with the National Transportation Safety Board. Prior to his appointment as Executive Secretary, he served as Commanding Officer of the Marine Safety Office in Honolulu.

Commander Utara and his family live in Bowie, Maryland. Mrs. Utara, the former June Johannsen, is a native of Astoria, New York. She and the Commander are the parents of three sons, David, Mark, and Christian, and one daughter, Dawn Marie. Christian, "the only one who doesn't get seasick," is presently concentrating on his schoolwork at Belair Junior High but has his eye on a future career with the Coast Guard.

Maritime Sidelights

New Head Appointed to U.S. Merchant Marine Academy

Thomas A. King has been selected to succeed Howard F. Casey as superintendent of the U.S. Merchant Marine Academy in Kings Point, New York. Mr. King is a 1942 graduate of the Academy. Following service in the merchant marine during World War II, he earned his master's license in 1945 and became one of the youngest officers to command a merchant ship .

Prior to his appointment, Mr. King served as eastern regional director of the Maritime Administration, an agency of the Department of Commerce he joined in 1949. Since the superintendent of the Academy is traditionally an officer, Mr. King was commissioned a rear admiral in the U.S. Maritime Service at the time of his appointment on July 13, 1980. He was commissioned a captain in the U.S. Naval Reserve on September 23, 1980.

Regulatory Guide for the Review and Inspection of the New Tank Vessel Standards

On April 1, 1980 the Coast Guard issued a "Draft Regulatory Guide for the Review and Inspection of the New Tank Vessel Standards." The purpose of this guide is to facilitate implementation and interpretation of the tank vessel regulations that were issued on 19 November 1979 regarding segregated ballast tanks (SBT), dedicated clean ballast tanks (CBT), crude oil washing systems (COW), inert gas systems (IGS), and improved steering gear standards.

The Coast Guard's original goal was to incorporate the appropriate tanker industry comments and the interpretations agreed to by IMCO at MEPC XIII (9 - 13 June 1980) in an updated version of the regulatory guide for distribution in October 1980. Many interpretations were considered at MEPC XIII , but final action on a majority of them was deferred until MEPC XIV (10 - 14 November 1980).

To provide a more complete document, distribution of the updated version of the regulatory guide will be delayed until January 1981 so that the interpretations agreed to at MEPC XIV can be included.

"Lunar Lander" Used to Probe Deep-Sea Floor

Oceanographers from the University of Rhode Island, the University of Washington, and Oregon State University joined the Scripps Institution of Oceanography in August to test an unmanned probe of the deep-sea floor off the California coast. The probe, called the Bottom Lander, was designed by Scripps to study the formation of manganese nodules on the ocean floor. These nodules contain metals that may be profitable to mine. The Lander makes it possible to isolate small sections of the sea floor for experiments on the circulation of various metals important to nodule formation. The role played by living and nonliving substances can also be determined.

After extensive testing, titanium and space-age plastics were chosen for the construction of the probe, which is designed to work for periods of several weeks to one year at depths of over two miles and at pressures one hundred times greater than sea-level atmospheric pressure. Plans for the Lander call for it to begin its duties on the ocean floor next year at five different deep-sea locations in the eastern Central Pacific.

Maritime Education Reform Bill Becomes Law

The Maritime Education and Training Act, passed by the House on June 30 and the Senate on September 30, was signed into law by the President on October 15, 1980.

This legislation, the result of four years of effort by a House subcommittee headed first by Rep. Gerry E. Studds, D-Mass. and later by Rep. Les AuCoin, D-Ore., establishes for the first time a service obligation for students graduating from the maritime academies. Graduates of the U.S. Merchant Marine Academy in Kings Point, New York, who receive full scholarships from the government, will in the future have to serve five years either as an officer in the U.S. Merchant Marine, as a commissioned officer in one of the armed forces of the United States, in the National Oceanic and Atmospheric Administration, or, in the event sea-going jobs are not available, in related maritime employment as defined by the Secretary of Commerce. A service obligation of three years is established for federally assisted graduates of the six state maritime academies.

The new law also curbs abuses in the system of nominating and appointing candidates to the U.S. Merchant Marine Academy. Gentlemen's agreements and sweetheart deals between members of Congress are being eliminated, admissions standards have been tightened, and preferential treatment for children of U.S. Merchant Marine Academy alumni is being ended.

Towing Safety Advisory Committee to be under Jurisdiction of Coast Guard

The Secretary of Transportation has delegated authority over the Towing Safety Advisory Committee established by Congress in January 1980 to the Commandant of the Coast Guard. The committee, which shall serve as a consultative body on shallow-draft inland and coastal waterway navigation and towing safety, shall consist of 16 members to be chosen from the barge and towing industry, the offshore mineral and oil supply vessel industry, port districts, authorities, or the terminal operators industry, maritime labor, the shipping industry, and the general public. A request for applications will be published in the Federal Register in early November.

Keynotes

The following were published between June 6, 1980, when the last issue of the Proceedings appeared, and October 20, 1980:

Final rules: CGD 80-021A Equipment Requirements for Boat Operators; Acceptance of Hand Red Flares as Visual Distress Signals, July 3, 1980. CGD 80-021 Distress Signals; Heptane Ignition Test for Hand Red Flares, July 3, 1980. CGD 78-041 Puget Sound Vessel Traffic Service, July 21, 1980. CGD 80-02 Revisions to Lists of Flammable and Combustible Bulk Cargoes, August 7, 1980. CGD 78-153 Tailshaft Examination, August 7, 1980. CGD 78-041b Puget Sound Vessel Traffic Service (amendment), August 11, 1980. CGD 79-148 Electronic Relative Motion Analyses, August 14, 1980. CGD 80-021A (correction) (see July 3 above), August 14, 1980. CGD 75-238 Notifications of Arrivals, Departures, Hazardous Conditions, and Certain Dangerous Cargoes, August 28, 1980. CGD 79-142 Special Service Load Line Vessels: Operation During the Hurricane Season, August 28, 1980. CGD 77-225 Low Specific Activity Radioactive Material, September 15, 1980. CGD 78-153A (correction) (see August 7 above), September 18, 1980. CGD 77-037 Suspension and Revocation Proceedings, September 29, 1980. CGD 79-165a Revocation of Obsolete Specifications (miscellaneous editorial corrections), September 29, 1980. CGD 79-165b Lifesaving Appliances (editorial amendment), October 2, 1980. CGD 80-133 General Provisions, October 20, 1980. CGD 80-131 Licensing and Certification of Seamen, October 20, 1980.

Proposed rules: CGD 75-237 Drawbridge Operation Regulations; Opening Signals for Drawbridges, June 26, 1980. CGD 75-124 Oil Pollution Prevention--Vessels and Marine Oil Transfer Facilities (correction) June 30, 1980. CGD 80-001 Unmanned Barges Carrying Certain Bulk Dangerous Cargoes, July 3, 1980. CGD 78-163 Exception From PFD Carriage Requirement for Sailboards, July 17, 1980. CGD 78-128 Safety Rules for Self-Propelled Vessels Carrying Hazardous Liquids, July 17, 1980. CGD 78-041a Puget Sound Vessel Traffic Service Area (supplemental notice), July 21, 1980. CGD 77-162 Damage Stability Standards for Great Lakes Bulk Dry Cargo Vessels (Advance Notice of Proposed Rulemaking), August 14, 1980. CGD 79-173 Temporary Licenses and Endorsements, August 18, 1980. CGD 79-087 Application for Certificate of Numbers: Change in Required Contents, August 21, 1980. CGD 79-151 Inland Waterways Navigation Regulations--Great Lakes, August 25, 1980. CGD 74-029 Houston-Galveston Vessel Traffic Service (Advance Notice of Proposed Rulemaking), September 18, 1980. CGD 79-158 Deepwater Port Liability Fund, October 2, 1980. CGD 79-095 Shipment of Bulk Liquid Hazardous Waste Cargoes by Water, October 14, 1980.

Notices: CGD 80-088 Termination of Approval Notice, August 4, 1980. CGD 80-089 Equipment List (Approval Notice), August 4, 1980. CGD 80-098 Study of Large Tank Barges and Solicitation of Information, August 7, 1980. CGD 80-100 Ship Structure Committee; Renewal, August 11, 1980. COMDTINST 5420.12E Chemical Transportation Advisory Committee (Charter), August 18, 1980. CGD 80-102 Termination of Approval Notice, September 11, 1980. CGD 80-103 Equipment, Construction, and Materials (Approval Notice), September 15, 1980.

Any questions regarding regulatory dockets and any requests from companies and individuals wishing to speak at public hearings should be directed to Commander A. D. Utara (G-CMC/24), U.S. Coast Guard Headquarters, 2100 Second St. SW, Washington, DC 20593; (202) 426-1477.

* * *

REVISION OF ELECTRICAL REGULATIONS CGD 74-125(A)

This regulation will constitute a general revision and updating of the electrical regulations to conform with the latest technology. It will include steering requirements for vessels other than tank vessels.

This revision is necessary because industrial standards for electrical engineering have changed in the past few years and the regulations must be brought up to date to reflect current industry practices.

An initial Notice of Proposed Rulemaking (NPRM) was published on June 27, 1977 (42 FR 32700). A supplemental NPRM was published as CGD 74-125A on March 3, 1980 (Part VII).

NEW TANK BARGE CONSTRUCTION CGD 75-083 UPGRADE OF EXISTING TANK BARGE CONSTRUCTION CGD 75-083a

This action is comprised of two regulatory projects centered on tank barge construction standards. These projects were the result of a Presidential initiative of March 17, 1977, directing a study of the tank barge pollution problem. One project will address new barge construction while the other will pertain to existing barges. Regulatory documents for both will be published at the same time, and joint public hearings have been held.

In July 1977 the Coast Guard began a reexamination of the tank barge construction standards. It was determined that new construction would be treated separately from existing barges. An Advance Notice of Proposed Rulemaking (ANPRM) was then issued to gather additional data and assess impacts related to existing barges.

The new NPRM on tank barge construction, withdrawing the prior NPRM and the ANPRM for existing tank barges, was published as part VI of the Federal Register of June 14, 1979 (44 FR 34440 and 44 FR 34443, respectively).

Public hearings on the dockets were held as follows: August 2, 1979, Washington, DC; August 15, 1979, Seattle, Washington; August 23, 1979, New Orleans, Louisiana;

September 5, 1979, Washington, DC; and September 7, 1979, St. Louis, Missouri. The comments made at the hearings have been incorporated in the docket.

On Thursday, November 8, 1979, a Federal Register notice extended the comment period on the project. This extension was based on the continued public interest and ran to December 1, 1979.

A Supplementary Notice was published as Part III of the Federal Register of March 13, 1980 (44 FR 16438). This notice informs the public of a deferment in the rulemaking process for these dockets. The comments received have raised significant questions concerning these proposals. It was decided that the entire tank barge pollution problem warranted a carefully considered study by a recognized independent body. The National Academy of Sciences/ National Research Council will conduct the study. Part of the study, a two-day workshop, was held April 15 and 16, 1980. The study will be completed by the end of January 1981. The Coast Guard will defer any further rulemaking on these proposals until completion of the study, and the dates in the proposals of June 14, 1979, are no longer valid. If the Coast Guard should pursue further action on these proposals, a new timetable will have to be developed.

Anyone wishing to obtain copies of the rulemaking may do so by contacting Commander A. D. Utara, Marine Safety Council (address is given in the introduction to the Keynotes section).

POLLUTION PREVENTION, VESSELS AND OIL TRANSFER REGULATIONS CGD 75-124a

This regulation would reduce accidental or intentional discharge of oil or oily wastes during vessel operations.

The basis of this regulation is threefold. First, there is the need to reduce the number and incidence of oil spills. Second, this regulation will help to clarify the existing rules. Finally, this regulation covers the additional requirement for oil-water separators under the 1973 International Convention for the Prevention of Pollution from Ships.

An NPRM was published on June 27, 1977 (42 FR 32670), and a supplemental NPRM was published on October 27, 1977 (42 FR 56625). Because of substantive changes in the regulation, there is currently no scheduled publication date for the final rule.

SEGREGATED BALLAST AND TANK CLEANING REGULATIONS GCD 77-058(b)

This regulation was initiated when President Carter directed the Secretary of Transportation to issue new rules for oil tanker standards which would include segregated ballast on all tankers and double bottoms on all new tankers which call at American ports. The provisions of these proposed regulations were changed by the February 1978 Intergovernmental Maritime Consultative Organization (IMCO) Conference to include Crude Oil Washing (COW) and Clean Ballast Tanks (CBT).

The NPRM was published on May 16, 1977 (42 FR 24868). As a result of the IMCO Tanker and Pollution Prevention Conference of February 1978, a new NPRM was issued on February 12, 1979 (44 FR 8984). Public hearings were then held in March in Washington, DC and San Francisco, California; 265 comments were received on the docket and analyzed. The final rules were published on June 30, 1980.

CONSTRUCTION AND EQUIPMENT EXISTING SELF-PROPELLED VESSELS CARRYING BULK LIQUEFIED GASES CGD 77-069

These regulations would amend the current ones to include the substantive requirements of the "Code for Existing Ships Carrying Liquefied Gases in Bulk" adopted by the Intergovernmental Maritime Consultative Organization (IMCO). The use of liquefied gas has increased, as have the problems associated with it. Because of its unique properties and the dangers associated with them, new regulations are being drafted. The environmental impact statement and regulatory analysis were completed in February 1979, and an ANPRM on these regulations is anticipated in November 1980.

LICENSING OF PILOTS CGD 77-084

This regulation takes into account the problems caused by increased ship size and unusual maneuvering characteristics. The proposal would require recency of service for each route upon which a pilot is authorized to serve, licensing with tonnage limitations commensurate with pilot experience, and consideration of ship-handling simulator training for pilots of very large vessels. A regulatory analysis and work plan were completed in October 1978. The NPRM is awaiting approval by the Secretary of Transportation. Publication will follow shortly thereafter.

REVISION OF 46 CFR 157.20-5 DIVISION INTO THREE WATCH REGULATION CGD 78-037

This revision would require an adjustment in vessel manning requirements to bring them into line with current legislation. It would change the requirements which identify personnel who must be used on the three watches and personnel who may be employed in a day working status. An NPRM formerly scheduled to be published on this docket in January 1980 has been deferred pending legislative action in Congress.

TANK VESSEL OPERATIONS-- PUGET SOUND CGD 78-041

This regulation governs the operation of tank vessels in the Puget Sound area. It was initiated to reduce the possibility of environmental harm resulting from oil spills in Puget Sound. This is to be accomplished by governing the operation of tankers and reducing the risk of collision or grounding.

Former Secretary of Transportation Brock Adams signed a 180-day interim rule on March 14, 1978, prohibiting entry of oil tankers in excess of 125,000 deadweight tons

in Puget Sound; this appeared in the Federal Register of March 23, 1978 (43 FR 12257). An ANPRM was published on March 27, 1978 (43 FR 12840). An extension of the interim rule was published in the Federal Register in order to allow the Coast Guard adequate time to complete this rulemaking.

The public hearings scheduled for June 11 and 12 in Seattle, Washington, June 13 in Mt. Vernon, Washington, and June 14 in Port Angeles, Washington, have been completed, and all the comments received have been entered in the docket files for consideration. The extension of the interim navigation rule was published on June 21, 1979 (44 FR 36174). This extension became effective July 1 and will be in effect until the Coast Guard prints notice of its cancellation. A supplemental NPRM was published on July 21, 1980 (45 FR 48827). Copies of documents or the transcripts of the hearings may be obtained by writing to the Marine Safety Council. A final rule on the docket is currently expected in December 1981.

PERSONNEL JOB SAFETY REQUIREMENTS FOR FIXED INSTALLATIONS ON THE OUTER CONTINENTAL SHELF CGD 79-077

This regulation is concerned with the health and safety requirements for installations engaged in oil field exploration and development. This action was mandated by pending Outer Continental Shelf (OCS) legislation. It will provide more comprehensive protection for personnel employed in vessels and installations in the oil trade.

QUALIFICATIONS OF THE PERSON IN CHARGE OF OIL TRANSFER OPERATIONS, TANKERMAN REQUIREMENTS CGD 79-116 and 79-116A

These regulations will redefine and establish qualifying criteria for the certifying of individuals engaged in the carriage and transfer of dangerous cargoes in bulk.

In has been found that most pollution incidents are the result of personnel error; consequently, the minimum qualifications of persons involved in handling polluting substances should be specified.

As stated in the last issue, these projects have been withdrawn (44 FR 25243). New NPRMs which were anticipated in June have been delayed and are now awaiting approval by the Secretary of Transportation. Publication will follow shortly thereafter.

SHIPBOARD NOISE ABATEMENT STANDARDS CGD 79-134

These standards will establish acceptable sound levels for each of the various vessel compartments based on the latest technology. The standards will differentiate acceptable sound levels for both existing vessels and new vessels, specify acceptable methods of compliance, and establish a hearing conservation program.

During the development of these standards, the U.S. Naval Ocean Systems Center (NOSC), San Diego, California, was contracted by the Coast Guard to evaluate sound levels aboard several U.S. merchant vessels, study the data obtained, and define the extent of the noise problem. NOSC was asked to use this data and other information available to recommend a set of noise levels to be included in the proposed standards for the control and/or elimination of the shipboard noise problem.

This study has been completed. Copies are available through the National Technical Information Service (NTIS), Springfield, Virginia 22161; request NOSC technical documents numbers 243, 254, 257, 267 and 405.

PERSONNEL AND MANNING STANDARDS FOR FOREIGN VESSELS CGD 79-081(B)

This regulation, deemed necessary to reduce the probability of oil spills, would establish minimum manning levels for foreign tank vessels operating in U.S. navigable waters. It would also establish procedures for the verification of training, qualification, and watchkeeping standards.

Correction: In the last issue of the Proceedings (June/July 1980), the docket number for the preceding regulation was mistakenly shown as CGD 79-081(A), and it was stated that the document had been published as an interim rule. The correct docket number is CGD 79-081(B), and publication as a proposed rule is anticipated in November 1980. The title of CGD 79-081(A), the document published as an interim rule on April 7, 1980 (45 FR 23425), is Evaluation of Programs for Licensing and Certification of Foreign Tank Vessel Personnel.

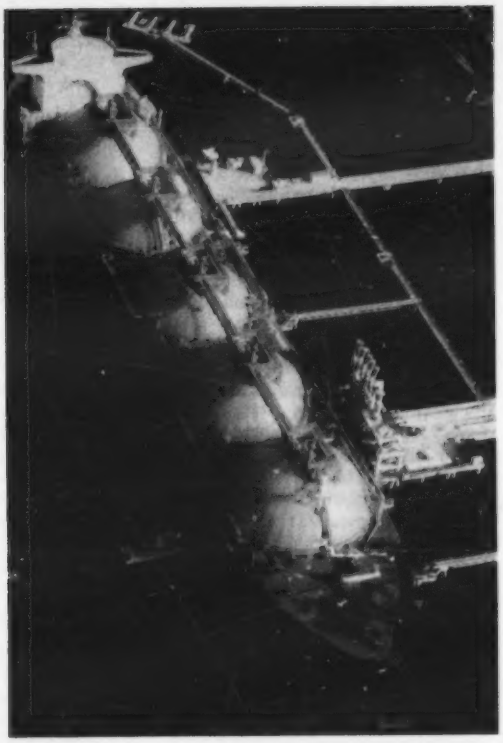
PERSONNEL SAFETY AND HEALTH REQUIREMENTS FOR INDUSTRIAL VESSELS CGD 80-15

This regulation is similar to CGD 79-077 and covers vessels engaged in exploration, supply, and support on the Outer Continental Shelf (OCS). Mandated by pending OCS legislation, this project covers the growing fleet of vessels which perform the various industrial functions involved in the exploration and development of offshore resources. The regulations, designed to provide more comprehensive personnel protection, are scheduled for an ANPRM in October 1980.

* * *

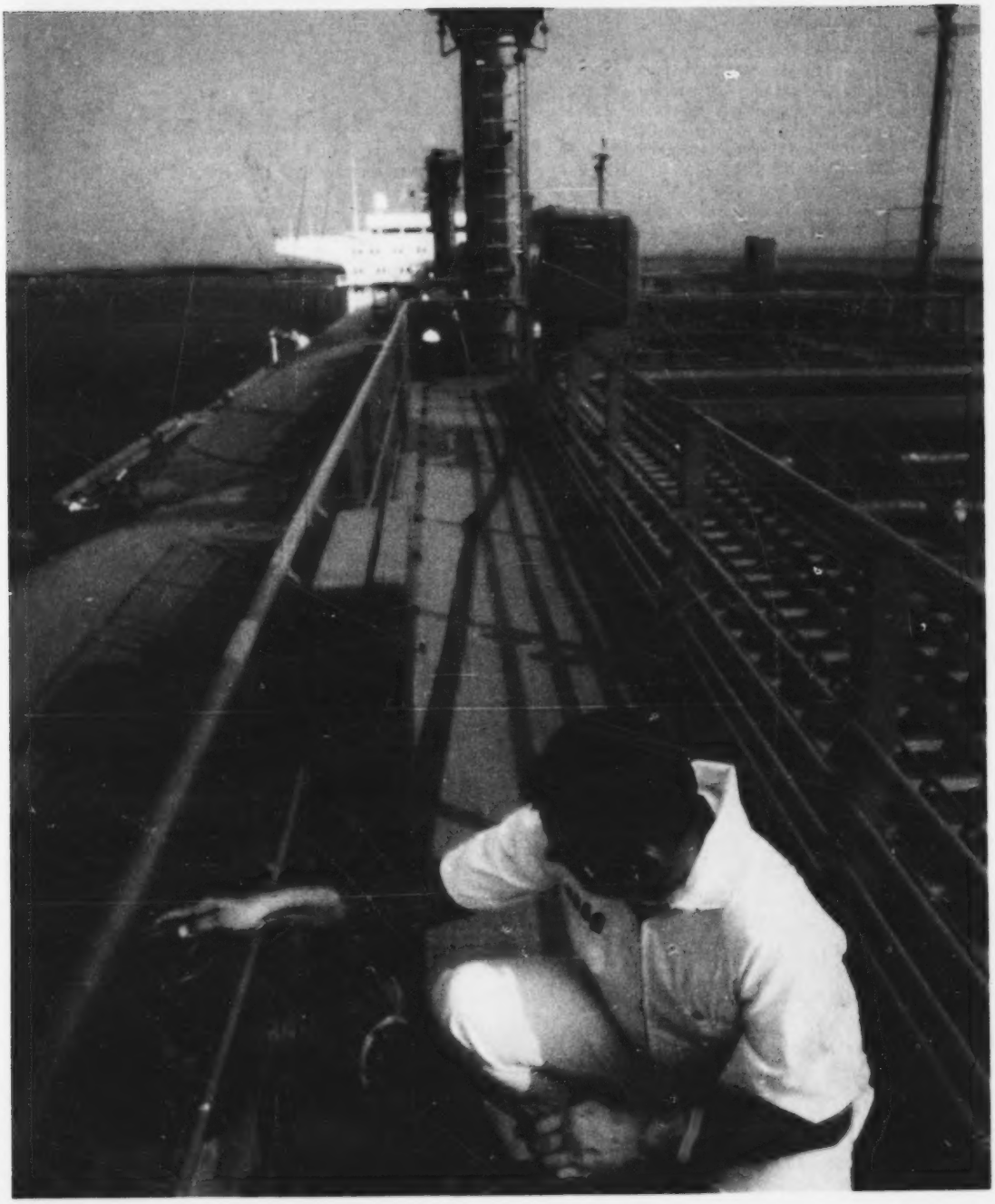
A complete listing of all Coast Guard proposed regulations, both "significant" and "non-significant," appeared in the Monday, August 25, 1980 Federal Register (45 FR 56538).

THE COAST GUARD HAS NO PUBLIC HEARINGS SCHEDULED AT THIS TIME FOR NOVEMBER.



Right: the SS GOLAR FREEZE is pushed into final position at the Elba Island LNG facility in the Port of Savannah. Below: Lt. Ralph Crawford inspects the shoreside terminal 24 hours before the arrival of the SS GOLAR FREEZE. Opposite page: CWO Chuck Brinson checks equipment on LNG carrier.

At ease, Savannah--



Above: CWO Brinson inspects the cargo handling room of the GOLAR FREEZE before allowing it to enter the Port of Savannah. Opposite page: Captain Harold C. Carlton and CWO Brinson look down the Savannah River across the GOLAR FREEZE's bow.

the Coast Guard's on the job

by Dale L. Puckett

The 56-foot pilot boat bobs like a cork in the swells of the Atlantic just beyond the sea-buoy that guides more than 4,000 large commercial ships into the Port of Savannah each year.

By comparison, the huge orange liquefied natural gas (LNG) carrier is as stable as a seawall. To the pilot in the Coast Guard helicopter 500 feet above, Chief Warrant Officer Chuck Brinson looks like an ant on the small boat's deck.

Brinson is checking the draft marks on the side of the SS GOLAR FREEZE. He has to make sure that the carrier has enough clearance to navigate the shallow waters of the Savannah River channel.

"You don't realize how really big these things are until you pull alongside," Brinson says. "As you approach, you find yourself looking down the side of a vessel that is longer than three football fields placed end to end--950 feet. She is nearly 50 yards wide, and her superstructure rises more than 140 feet above the waterline. She carries enough natural gas to keep a city of 50,000 people warm for a month."

Brinson is the vanguard of a carefully-planned Coast Guard operation designed to ensure the safety of commerce moving in the Port of Savannah while liquefied natural gas is being delivered to the Southern Natural Gas Company terminal on nearby Elba Island. Despite the size of the ships and the responsibility involved, it is an operation that has become routine to each of the 25 men and women assigned to the local Coast Guard Marine Safety Office. Yet, the job is not without an element of danger.

"Just getting aboard the LNG ship is a trick," Brinson says. "You have to get from the pilot boat onto a rope ladder--and all this time the boat is moving up and down along the side of the ship. When you finally reach the rope ladder, you must climb 10 to 15 feet and then leap onto an accommodation ladder. You're really in trouble if you look below. It's very easy to get dizzy when you suddenly realize the water is more than 100 feet straight down."

Fortunately, Brinson has a lot to keep his mind busy while he climbs the ladder.

"You keep going over the inspection list in your mind," he says. "You ask yourself, 'What would it take to make me hold up one of these ships?' You know if you do, it will cost the company thousands of dollars."

Once aboard the vessel, Brinson introduces himself to the mate with a firm handshake and goes right to work. Still, nearly an hour will pass before he finally gives the master permission to enter the Port of Savannah.

He checks the cargo manifest. He takes the vessel's safety plan and goes through every step of a long checklist. He turns on the sprinklers that extend over the giant LNG tanks. As he does this, a foggy mist forms over the huge tanks, and from the bridge it looks like four enormous orange hot-air balloons are moving through the clouds.

But the inspection shows that all is well, and the vessel steams toward the Savannah River.

To the uninitiated on the bridge of the LNG ship, it appears that the pilot is trying to thread a heavy nylon line into a number three needle. Slowly but surely, however, the mouth of the river seems to grow wider, and the pilot eases the ship into the buoyed channel with 50 to 60 yards to spare on each side.

Shortly after the GOLAR FREEZE enters the river, a 32-foot Coast Guard utility boat slips into position in front of the huge carrier, its blue safety light flashing brightly. Above, a Coast Guard helicopter watches for traffic that might cause a problem, and at the river's intersection with the Intercoastal Waterway, a 17-foot Coast Guard boat holds up all traffic until the LNG ship has passed.

Three hours after he boarded the GOLAR FREEZE at the sea-buoy, Brinson walks down the gangway at the Elba Island terminal and joins Lt. Ralph Crawford. The two compare notes and make plans to allow the offloading of the liquefied natural gas.

Crawford had inspected the shore facility 24 hours

before the ship's arrival. He checked the cargo transfer equipment, the fire protection equipment, and all safety devices. If any of the equipment had flunked the inspection, the terminal crew would have had 24 hours to solve the problem.

"I like to make sure the ultraviolet sensors are working properly because they can detect the heat intensity of a fire before the human eye can see it," Crawford says. "If a fire were to break out, the sensors would cause the plant's computer to shut down any transfer operation immediately."

Crawford also tests every gas sensor at the dock and makes sure that all dry chemical fire protection equipment is in order. He operates the giant chicksam arms that lower the transfer pipes from the dock to the ship and tests the emergency shutdown system that would take over should the ship be pulled away from the dock during the transfer.

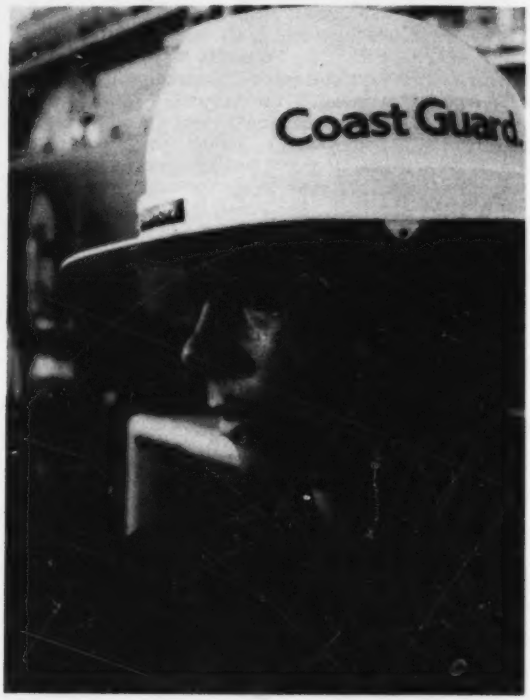
Both Brinson and Crawford work for Capt. Harold C. Carlton, Captain of the Port of Savannah. Carlton controls all traffic in the Savannah River, and the monitoring of an LNG movement is only a small part of his job; yet for a 24-hour period almost every other week, he must use 18 of his people for this job.

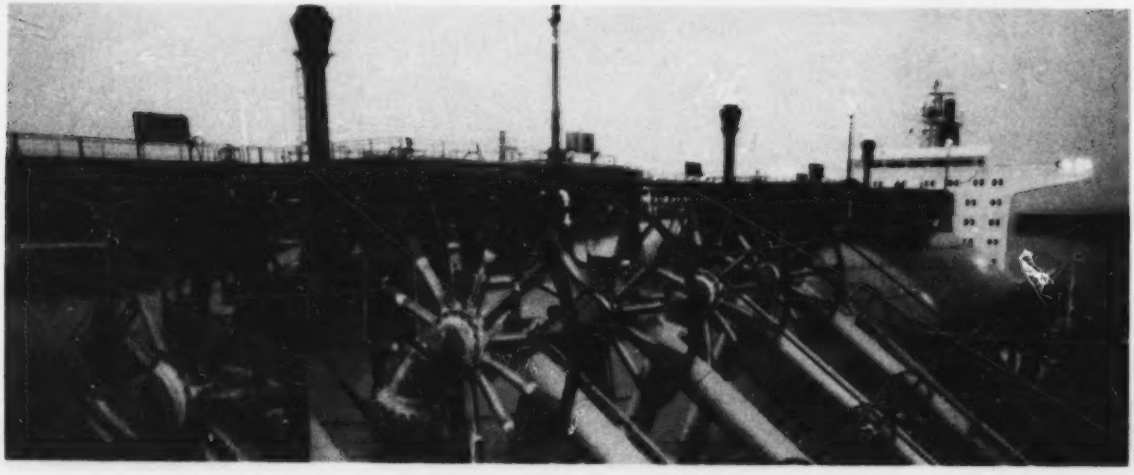
"While the LNG transfer is being monitored, I wonder in the back of my mind what else might occur," Carlton says. "There could be an oil spill that would require a large crew to monitor and clean up. There could be a fire aboard a vessel that would require our immediate attention. There are ammonium nitrate and anhydrous ammonia shipments through the port all the time. They require constant monitoring."

Carlton's men and women are busy--but they are also appreciated.

"The leadership and the coordination provided by the Marine Safety Office of the U.S. Coast Guard are certainly something we can all be proud of," says George Nicholas, the president of the Georgia Ports Authority. "The tremendous growth in the number of ships calling at the Port of Savannah and the increased number of energy ships that are coming in provide a serious challenge. However, the Coast Guard has it all under control."

The general public also seems to recognize the effectiveness of the work done by the Captain of the Port and his crew. A woman who lives across the river from the Elba Island terminal says, "Even though the tanks are in full view as I cross the bridge to work each morning, I rest easy because I know that when those ships arrive, the Coast Guard is watching every minute that the gas is being transferred."





Right: Lt. Ralph Crawford leaves the GOLAR FREEZE after a final check before allowing the Elba Island crew to start offloading the LNG. Below: the sun sets over the chicksam arms that carry the LNG from the huge carrier to the shoreside terminal. Offloading began five hours after the ship departed the sea buoy.

Chemical of the Month

ANHYDROUS AMMONIA: NH_3

synonyms:	ammonia gas, liquid ammonia
Physical Properties	
boiling point:	-33.4° C (28.1° F)
freezing point:	-77.7° C (-107.9°F)
vapor pressure at 46° C (115° F):	18.1 atm (266 psia)
Threshold Limit Values	
time weighted average:	25 ppm (0.0025 %)
short term exposure limit:	35 ppm (0.0035 %)
Flammability Limits in Air	
lower flammability limit:	16 %
upper flammability limit:	25 %
Densities	
liquid density:	0.68 (water = 1.0)
vapor density:	0.6 (air = 1.0)
Identifiers	
U.N. Number:	1005
CHRIS Code:	AMA

Anhydrous ammonia is a commonly shipped commodity which must be handled with care because of its toxic qualities. Breathing ammonia vapor in a concentration of 5000 ppm (0.5 %) will cause immediate death, while exposure to a vapor concentration of 700 ppm (0.07 %) will cause damage to the eyes. To reduce shipping costs, the ammonia is reduced in volume through liquefaction by refrigeration or pressurization. Contact with the refrigerated liquid can result in frostbite, as can contact with any object whose surface temperature has been reduced by contact with the liquid (pipings, valves, etc.). Although ammonia is flammable, sustained burning will not take place unless the fuel-air mixture is pressurized or heated or oxygen is present rather than air. (The Department of Transportation classifies ammonia as a non-flammable gas.) Ammonia is caustic in both its liquid and vapor states. Fortunately, ammonia is lighter than air when both are at the same temperature and so disperses readily.

"Anhydrous" means "without water" and is used to refer to ammonia in its pure form, i.e., ammonia containing no water. Ammonia compounds were first used by the Egyptians in the fourth century B.C., but ammonia was not produced synthetically in large quantities until after 1910. Interestingly, much of the atmosphere of Jupiter and Saturn is composed of ammonia. While some ammonia is produced naturally on earth, the amount is negligible compared to the amount produced synthetically.

Anhydrous ammonia is usually made from natural gas. It is applied directly as a fertilizer and used in the manufacture of other fertilizers, explosives, inorganic and organic chemicals, and cleaning agents; many people have ammonia-derived cleansers in their homes. Anhydrous ammonia is produced in great quantity. In 1979 over 18 million tons were produced in the United States; only sulfuric acid and lime were produced in greater quantity.

Anhydrous ammonia is regulated by the U.S. Coast Guard, the U.S. Department of Transportation, the Environmental Protection Agency, and the Inter-Governmental Maritime Consultative Organization. It is classified as a liquefied gas by the Coast Guard. Because of its toxic effects, the Coast Guard requires that it be shipped in Type II hulls and that closed gauging be used to limit crew exposure.

The Coast Guard completed a small-scale ammonia spill R&D program in 1974 and is conducting a large scale test series involving spills on water as well as on land. The purpose of the study is to learn how the ammonia interacts with the water on which it is spilled and how the vapor disperses downwind.

ALAN SCHNEIDER, Sc. D. and CURTIS PAYNE, B. A.

HAZARD EVALUATION BRANCH
CARGO AND HAZARDOUS MATERIALS DIVISION

A Time For Thanks

Nautical Queries

The following items are examples of questions included in the Third Mate through Master examinations and the Third Assistant Engineer through Chief Engineer examinations.

DECK

(1) You are attempting to locate your position with reference to a hurricane center in the Northern Hemisphere. If the wind direction remains steady but velocity diminishes with time, you are most likely

A. in the right semicircle.
B. in the left semicircle.
C. on the storm track ahead of the center.
D. on the storm track behind the center.

REFERENCE: Meteorology (Donn)

(2) An inert gas system installed on a tanker is designed to

A. aid in the stripping and cleaning of cargo tanks.
B. increase the rate of discharge of cargo.
C. force toxic and explosive fumes from a cargo tank to vent to the outside atmosphere.
D. lower the oxygen levels inside cargo tanks, making explosion nearly impossible.

REFERENCE: Tanker Operations (Marton)

(3) A yellow signal floating in the air from a small parachute about 300 feet above the water would indicate that a submarine

A. has fired a torpedo during a drill.
B. is about to rise to periscope depth.
C. is on the bottom in distress.
D. is disabled and unable to surface.

REFERENCE: Coast Pilots (under General Information)

(4) Which condition is necessary for a substance to burn?

A. The temperature of the substance must be equal to or above its flash point.
B. The air must contain oxygen in sufficient quantity.
C. The mixture of vapors with air must be within the "explosive range."
D. All of the above.

REFERENCE: CG 329

(5) Because radio waves travel great circles, which type of chart may require corrected plotting?

A. Lambert conformal
B. Gnomonic
C. Stereographic
D. Mercator

REFERENCE: Dutton 13th Edition

ENGINEER

(1) In a main propulsion turbine, where are the moisture shields located?

A. Around throttle valve stems
B. At the steam strainer inlet
C. At the inner stage diaphragms
D. On the last stages of the rotor blading

REFERENCE: Harrington,Osbourne

(2) A water-jacket is frequently placed around the exhaust manifolds of propulsion diesels. This is done to

A. reduce heat radiation to the engine room.
B. aid in preventing turbocharger overheating.
C. condense and drain moisture from exhaust gases.
D. dampen exhaust gas pulsations in the manifold.

REFERENCE: Maleev, Engineman 2 and 3

(3) Allowances may be made for expansion and contraction in piping by the use of expansion joints or

A. unions.
B. retractable flanges.
C. union bulkhead fittings.
D. bends or loops in the line.

REFERENCE: Principles of Naval Engineering

(4) If you hear more than six short blasts and one long blast of the whistle supplemented by the same signal on the general alarm, you should

A. start the fire pump.
B. go to your man overboard station.
C. go to your lifeboat station.
D. stand by for collision.

REFERENCE: Osbourne

(5) A Marine Chemist's Certificate stating that a tank or void space is safe for men to enter is valid only if

I. work has begun in the tank or void within 24 hours of the certificate's issuance.

II. there is no change in the status of vessel, tank, or void space.

A. I only
B. II only
C. Both I and II
D. Neither I nor II

REFERENCE: CG 174

ANSWERS

Deck
1.D;2.D;3.B;4.D;5.D

Engineer
1.D;2.A;3.D;4.C;5.C

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications may be obtained from the nearest marine safety office, marine inspection office or by writing: **Commandant (G-CMA/TP26), U.S. Coast Guard, Washington, DC 20593.** Because changes to the rules and regulations are made from time to time, these publications can be kept current between revisions only by referring to the Federal Register. (Official changes to all Coast Guard authored federal regulations are published as final rules in the Federal Register on Mondays or Thursdays.) Following the title of each publication in the table below are the dates of the most recent editions and changes, if any.

The Federal Register may be obtained by subscription ($5 per month or $50 per year) or by individual copy (75 cents each) from SupDocs, U.S. Government Printing Office, Washington, DC 20402.

	CG No.	TITLE OF PUBLICATION
		NOTE: This is a newly revised list; please check carefully for changes.
1	CG-101-1	Specimen Examinations for Merchant Marine Deck Officers (2nd and 3rd Mate) (4-1-77).
	CG-101-2	Specimen Examinations for Merchant Marine Deck Officers (Master and Chief Mate) (7-1-78).
	CG-108	Rules and Regulations for Military Explosives and Hazardous Munitions (4-1-72). FR 7-21-72, 12-1-72, 6-18-75, 9-26-77, 5-12-80.
4	CG-115	Marine Engineering Regulations (8-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78, 3-12-79, 5-3-79, 2-19-80, 4-21-80, 9-29-80.
	CG-123	Rules and Regulations for Tank Vessels (8-1-77). Ch-1, 4-78. FR 1-3-77, 8-18-77, 9-12-77, 9-26-77, 9-29-77, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79, 11-19-79, 12-27-79, 1-31-80, 3-3-80, 4-3-80, 4-7-80, 4-10-80, 4-14-80, 5-5-80, 5-30-80, 8-7-80, 9-29-80.
	CG-169	Navigation Rules - International - Inland (5-1-77). FR 7-11-77, 7-14-77, 9-26-77, 10-12-77, 11-3-77, 12-6-77, 12-15-77, 3-16-78.
	CG-169-1	Colregs Demarcation Lines (7-15-77).
	CG-172	Rules of the Road - Great Lakes (7-1-72). FR 10-6-72, 11-4-72, 1-16-73, 1-29-73, 5-8-73, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 1-13-77, 11-3-77, 12-6-77.
1	CG-174	Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products (9-1-76).
1,2	CG-175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3-1-73).
1,2,4	CG-176	Load Line Regulations (2-1-71). FR 10-1-71, 5-10-73, 7-10-74, 10-14-75, 12-8-75, 1-8-76, 7-24-78, 8-28-80.
	CG-177	Yacht Admeasurement and Documentation (9-72).
	CG-182-1	Specimen Examinations for Merchant Marine Engineers License (2nd and 3rd Assistant) (4-75).
	CG-182-2	Specimen Examinations for Merchant Marine Engineer Licenses; First Assistant Engineer, Steam and Motor, any Horsepower (4-76).
	CG-182-3	Specimen Examinations for Merchant Marine Engineer Licenses; Chief Engineer Steam and Motor, any Horsepower (4-76).
	CG-184	Rules of the Road--Western Rivers (8-1-72). FR 9-12-72, 12-28-72, 3-8-74, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 3-1-76, 6-10-76, 7-11-77, 12-6-77, 12-15-77.
	OLD CG-190,	Equipment Lists (8-1-79), now M16714.3.
1	CG-191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (11-1-76). FR 3-3-77, 5-16-77, 8-8-77, 4-9-79, 12-6-79.
	CG-227	Laws Governing Marine Inspection (7-1-75).
	CG-242	International Conventions & Conferences on Marine Safety (6-51).
1,2,5	CG-257	Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-77). Ch-1, 3-17-78. FR 1-31-77, 9-26-77, 9-29-77, 12-19-77, 10-10-78, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79, 4-10-80, 5-5-80, 9-29-80.
	CG-258	Rules and Regulations for Uninspected Vessels (4-77). FR 9-26-77, 9-29-77, 6-14-79, 7-2-79, 12-17-79, 2-4-80, 2-19-80.
	CG-259	Electrical Engineering Regulations (7-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78.
	CG-268	Rules and Regulations for Manning of Vessels (7-1-77). FR 11-19-79.
1	CG-293	Miscellaneous Electrical Equipment List (6-73).
	CG-323	Rules and Regulations for Small Passenger Vessels (7-1-77). Ch-1 3-17-78. FR 9-26-77, 10-25-77, 12-15-77, 7-17-78, 3-12-79, 6-14-79, 7-2-79, 12-13-79, 2-19-80, 3-3-80, 9-29-80.
	CG-329	Fire Fighting Manual for Tank Vessels (1-1-74).
1	CG-388	Chemical Data Guide for Bulk Shipment by Water (1976).
1	CG-403	Great Lakes Pilotage Regulations (7-76).
	CG-439	Bridge to Bridge Radiotelephone Communications (12-1-72). FR 12-28-72, 3-8-74, 5-5-75, 7-11-77.
1	CG-467	Specimen Examinations for Uninspected Towing Vessel Operators (10-1-74).
	CG-474	When You Enter That Cargo Tank (3-76).
	OLD CG-478,	Liquefied Natural Gas and Liquefied Petroleum Gas, Views and Practices, Policy and Safety (3-80), now M16616.4.
	CG-480	Oil Pollution Control for Tankermen (6-75).
	CG-482	Benzene Safe Handling Practices (12-76).
	CG-488	Shippers Guide to Hazardous Materials Regulations (Water Mode) (8-77).
	CG-491	Safety for Small Passenger Vessels (8-77).
	OLD CG-497,	Rules and Regulations for Recreational Boating (12-78), now M 16752.2 (12-78) FR 7-19-79.
3	CG-515	Rules and Regulations for Foreign Vessels Operating in the Navigable Waters of the U.S. (2-78). FR 1976--7-8, 8-26, 9-16, 9-20, 12-13, 12-20. 1977--1-3, 5-16, 5-19, 6-16, 7-7, 7-14, 7-21, 7-25, 8-4, 8-11, 9-8, 9-12, 9-22, 9-26, 9-29, 11-10, 12-8, 12-15, 12-19. 1978--4-6, 5-18, 5-22, 6-29, 7-24, 8-10, 9-11, 9-25, 11-16, 11-20, 11-30, 12-7, 12-28. 1979--1-22, 1-25, 2-5, 2-12, 2-26, 3-29, 4-12, 4-16, 4-24, 5-3, 5-7, 5-31, 6-14, 6-21, 8-2, 8-16, 8-27, 9-4, 9-24, 10-15, 10-18, 11-1, 11-5, 11-19, 12-3, 12-10, 12-27. 1980--1-10, 1-31, 2-4, 2-19, 3-10, 3-20, 3-24, 3-31, 4-10, 4-14, 5-5, 5-8, 5-19, 5-22, 6-26, 6-30, 7-17, 7-21, 8-7, 8-11, 8-14, 8-18, 8-28, 9-29.
1	CG-526	Utilizing the Packaged Hazardous Materials Regulations, 49 CFR (5-78).
	Safety of Life at Sea:	Convention, with Regulations, London, June 17, 1960.
	Specifications for Merchant Vessel Equipment (Subparts of Chapter Q, 46 CFR, parts 160 to 164. 4-10-80, 5-5-80, 7-3-80, 9-29-80.	

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1 Temporarily out of stock
2 Under revision
3 Available only through Superintendent of Documents (SupDocs)
4 Text can be found in Title 46 of the Code of Federal Regulations, Parts 41-69
5 Text can be found in Title 46 of the Code of Federal Regulations, Parts 90-109.

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cover

After a marine chemist has certified that it is safe for him to enter, a marine inspector checks the integrity of a tank. The marine inspector depends on the marine chemist and his expertise to ensure his own safety. To find out more about the relationship between these two men, see the article beginning on page 162.

Season's Greetings

As another year draws to a close, our hearts go out to the many friends and relatives of the Merchant Mariners who were aboard the M/V POET. May this sobering reminder that the sea still claims many lives serve to renew our dedication to the goal of safe voyages for all. May we also share the joy of those whose loved ones will be able to spend this and many holiday seasons at home with their families. The Marine Safety Council wishes you all health, hope, peace, and happiness during this holiday season.

CLIFFORD F. DEWOLF
Rear Admiral, U.S. Coast Guard
Chairman, Marine Safety Council

Maritime Sidelights

MarAd Opens New Fire Training Center in New Orleans

The Maritime Administration completed the third phase in its plan to offer regional firefighting courses to seafarers throughout the country on November 19, 1980, with the dedication of its new Merchant Seaman Fire Training Center at 13200 Old Gentilly Road in New Orleans.

MarAd, an agency of the Department of Commerce, in cooperation with the Navy's Military Sea-

lift Command, has been sponsoring marine firefighting facilities for several years. A facility was opened in Earle, New Jersey, in 1975, and MarAd signed a formal agreement in 1979 to send 1200 people a year to the facility at Treasure Island (San Francisco), California. A fourth facility, to serve the Great Lakes maritime community, is scheduled to open in Toledo, Ohio, next spring.

The New Orleans training center provides practical or "hands-on" instruction to all persons engaged in waterborne commerce, enabling them to meet proposed training requirements for certification or endorsement as U.S. merchant seamen. Classroom courses are prerequisites to the hands-on training. This instruction is provided at designated educational institutions in MarAd's Central Region, which embraces the Gulf Coast area and the Mississippi River basin.

Separate courses are offered in fighting fires aboard barges and merchant ships. The barge course requires 8 hours of classroom instruction and 8 hours of practical training at the New Orleans center, while the ship course requires 16 hours of instruction in each of the categories.

Bruce A. McAllister, deputy assistant secretary of commerce for maritime affairs, hailed the dedication as "significant" for the U.S. maritime industry "in its historic effort to safeguard the lives of seafarers and reduce the great loss in property due to fires as sea."

McAllister said fire losses have been increasing in merchant shipping throughout the world; shipboard fires in U.S.-flag vessels alone currently cause average property damage of $75 million a year. In 1975, a MarAd study showed, 20 seafarers lost their lives in fires aboard U.S.-flag vessels. If nothing is done to stem the rise in casualties, McAllister said, indications are that dollar losses will rise to $100 million and deaths will nearly double (to about 40) annually in the U.S. commercial fleet by the year 2000.

American Petroleum Institute Releases New Manual

The American Petroleum Institute has just released the "Manual of Petroleum Measurement Standards, Chapter 11.1--Volume Correction Factors." The manual, a collection of volume correction factor tables and related tables, is used worldwide in custody transfer and accounting operations to adjust bulk volumes of crude oil and products measured at temperatures other than base temperature.

The new edition is available in four formats: plasticized paper, magnetic tape, card deck, and microfiche. The 10 printed volumes may be purchased individually for $45.00 each or as a full set for $450.00. The magnetic tape, card deck, and microfiche are available only as full sets, with Volumes I-IX in the preferred mode and Volume X in paper, for $450.00 per set.

Postage will be billed on each order. Orders may be placed with the American Petroleum Institute, Publications and Distribution Section, 2101 L Street NW, Washington, DC 20037. Questions about the tables and their use should be directed to Measurement Coordination, API, at (202) 457- 7055.

(Reprinted from the American Waterways Operators, Inc. "Weekly Letter" of September 27, 1980, Volume XXXVII, No. 39)

New Law Revises Able Seaman Standards

On October 6, 1980, Congress passed a new law reducing the number of previously existing categories of Able Seaman within the Coast Guard's licensing and seaman's documentation structure from six to four. The new categories and their service requirements are as follows:

(1) Able Seaman--Any Waters, Unlimited. This is equivalent to the old endorsement and requires 3 years' service on deck on vessels operating on the oceans or the Great Lakes.

(2) Able Seaman--Limited. This incorporates Able Seaman--Great Lakes--18 months and requires 18 months' service on deck on vessels of 100 gross tons or over operating in a service not exclusively confined to the rivers and smaller inland lakes of the United States.

(3) Able Seaman--Special. This incorporates Able Seaman--Any Waters--12 months, Able Seaman--Tugs and Towboats--Any Waters, Able Seaman--Bays and Sounds--12 months, vessels 500 gross tons or under not carrying passengers, and Able Seaman--Seagoing Barges--12 months and requires 12 months' service on deck on vessels operating on the oceans or the navigable waters of the United States, including the Great Lakes.

(4) Able Seaman--Special (OSV). This is a new category limited to service on offshore supply vessels and requires 6 months' service on deck on vessels operating on the oceans or the navigable waters of the United States, including the Great Lakes.

Individuals holding a merchant mariner's document with any of the old endorsements may, upon request, have the document endorsed to reflect the new standardized endorsements or may serve within the equivalent capacity noted above without further endorsement.

In addition to revising the categories, the statute's provisions reduce the minimum qualifying age for an Able Seaman's endorsement from 19 to 18.

Coast Guard May Get Fleet of Airships

The U.S. Coast Guard's familiar racing stripe may one day be seen on a fleet of modern blimps, if a research project proves that airships can be effective in patrol operations.

On April 30 the Coast Guard signed an agreement with the National Aeronautics and Space Administration to develop technology that could lead to an operational lighter-than-air machine by late in this decade or early in the 1990s.

According to Commander Kenneth Williams, chief of the Coast Guard's conservation and technology branch in Washington, DC, the service is looking for a vehicle that can be used in search and rescue, law enforcement, and other patrol functions.

Williams envisions a machine that would be two to three times larger than the Goodyear blimp and could carry 8 to 11 people. It would have a cruising speed of 50

to 60 knots, a maximum speed of 100 knots, a 2-day patrol range of 2,500 miles, and an altitude range of between 5,000 and 6,000 feet.

The craft would have to be able to take off and land vertically and hover in a small circle for rescue operations.

The Coast Guard has awarded a contract for development of a sub-scale prototype to the Naval Air Development Center. If the prototype is successful in its test missions, development of a full-scale model will proceed.

Coast Guard Publishes Consumer Program

The Coast Guard's final Consumer Program was published in the Federal Register on December 1, 1980, and is now available from U.S. Coast Guard Headquarters. The program was prepared in response to Executive Order 12160 and is designed to increase consumer/citizen participation in the review and development of rules, policies, and programs. "Consumer" is defined as one who uses or purchases marine products or marine transportation services. The Executive Order requires the agency to appoint an identifiable and accessible consumer affairs officer who will represent the consumer perspective, develop and distribute information materials for consumers, provide consumer affairs training for agency personnel, and develop systematic procedures for consumer complaint handling.

For further information contact: Commander Neal Mahan, Office of Boating, Public, and Consumer Affairs (G-BA), Room 4224, U.S. Coast Guard Headquarters, 2100 Second St. SW, Washington, DC 20593; (202) 426-1080. Office hours are from 6:30 a.m. to 5:00 p.m. Monday through Thursday.

Department of Transportation Establishes Fees for Yacht Documentation

On October 20, 1980, a final rule went into effect requiring yacht owners to pay a fee for documentation of yachts used exclusively for pleasure.

The Department of Transportation Fiscal Year 1981 Appropriation Act contains a provision prohibiting any funds provided by the Act from being used for expenses related to yacht documentation, except to the extent fees are collected from yacht owners.

The rule establishes a fee of $75.00 for documenting a yacht and $15.00 for the renewal of a document or endorsement of a change of master on the document. These figures were derived from the cost of documenting yachts during 1979.

Establishment of the above fees enables the Coast Guard to continue its documentation service. Federal documentation is not mandatory (yacht owners may obtain a certificate of number from a state boating authority), but documentation renders a vessel eligible for financing under the Ship Mortgage Act, thus making the vessel secured under it an attractive investment for lenders, affords greater protection for a vessel in many foreign ports, and offers a vessel marking system preferred by yacht owners. A vessel's document can be maintained even if the location of principal use changes from state to state.

Annual Boating Safety Seminar Set for Tampa

Representatives from national boating organizations, the boating industry, and the U.S. and Canadian governments as well as others interested in boating will meet March 10-12, 1981, in Tampa, Florida, to exchange ideas on boating education and safety.

The occasion is the Sixth Annual Boating Education Seminar, co-sponsored by the National Safe Boating Council, Inc. and the U.S. Coast Guard. This year's theme is "Handling Emergencies."

Six workshops are scheduled on such topics as fast-water rescue, rough-weather sailing and navigation, risk management, and fire and explosion prevention. In addition, the program will include time and space for participants to display the latest developments in boating education and safety.

The seminar will be held at the Admiral Benbow Inn, 1300 Westshore Boulevard, Tampa, Florida; (813) 879-1750. Anyone interested in boating safety and education is invited and encouraged to attend. There will be a registration fee of $35.00. Additional information may be obtained by contacting Lieutenant Commander William R. Ladd, U.S. Coast Guard Headquarters, 2100 Second Street SW, Washington, DC 20593; (202) 472-2373.

New Law Unifies Inland Navigational Rules

On December 24, 1980, the President signed into law a bill passed by Congress to unify the rules for preventing collisions on the inland waters of the United States.

The various sets of Rules of the Road (previously, seven sets of rules governed the navigation of vessels on the Inland Waters, Great Lakes, and Western Rivers of the United States) have not undergone comprehensive revision since 1895. Attempts to consolidate the rules date back to 1964. When it became evident in the late 1960s that a new set of international rules was in the offing, action on the inland rules was deferred.

Following the adoption of the Convention on the International Regulations for Preventing Collisions at Sea, 1972, the Coast Guard assigned the task of developing proposed revisions to its Rules of the Road Advisory Committee, a body representing a cross-section of maritime interests that used, or were familiar with, the United States' various inland waterway systems. The new rules, which are based on that committee's recommendations, were written to conform as closely as possible to the international regulations.

The new law will go into effect one year after enactment. More detailed information on the new rules will be published in a future issue of the Proceedings. ↓

Since our readership increases every month, some of our new readers might not be familiar with the process of rulemaking or some of the terms used to describe regulations in their various stages of development. We would like, therefore, to preface this month's edition of the Keynotes with the following "layman's guide":

THE COAST GUARD PROCESS FOR PROMULGATING REGULATIONS

The process by which the Coast Guard promulgates regulations is slow and methodical. Each proposal is reviewed, opened for public comment, and discussed and reviewed again before becoming final.

There are three identifiable stages in this process: the conceptual stage, the proposal stage, and the final rule stage.

The impetus for the regulation can come from various sources: public awareness of a problem area, a Presidential directive, a statute calling for regulations (such as the Port and Tanker Safety Act of 1978) or, most sadly, a maritime casualty.

Once the need for corrective action is demonstrated, a project manager is selected at Coast Guard Headquarters. The project manager examines the problem and looks at alternative solutions. He decides whether a regulation is the proper solution or whether some other answer might be more appropriate. Most problems which come to the Coast Guard for consideration are handled in some other way than by regulation. If a regulation seems to be the best answer, however, the project manager develops a work plan.

The project manager sets forth the following points in his work plan: 1) the need for the regulation--i.e., what prompted the regulatory activity; 2) the objectives to be accomplished and the means of accomplishment, stated as explicitly as possible; 3) the alternatives considered and the various impacts the proposed alternatives will have on the economy, the environment, small businesses, the cities, local governments, consumers, the regulated parties, and the general public; 4) the major problems or issues expected to be encountered in preparing the regulation; 5) the authority for the regulation; 6) how the public input will be accommodated; and 7) recommended priority and proposed timetables for preparation.

The work plan is given a preliminary and legal review to determine whether there appears to be statutory authority to carry out the proposal; it is then reviewed by the officials responsible for the program area concerned. When the program director of the regulation --a Coast Guard admiral--is satisfied that there is a need for the regulation and that the proposal is the best of the available alternatives, the work plan is submitted to the Marine Safety Council for consideration.

The Marine Safety Council consists of seven admirals and is chaired by the Chief Counsel. Included on the Council are the program directors responsible for the major regulatory areas--Merchant Marine Safety, Marine Environmental Protection, Boating, Public, and Consumer Affairs, and the other offices which have an interest in regulations development.

The Marine Safety Council reviews all the factors considered in the work plan. Each member brings to bear the expertise of his staff and the particular concern of his office. Only when the Council is convinced that a genuine need for the regulation exists and that the concept represents the best available alternative in terms of accomplishing the desired objectives does it give its approval to proceed with the project.

If the proposal involves a significant regulation, the work plan must receive the Commandant's approval and eventually be reviewed by the Secretary of Transportation and his staff. A significant regulation is one which will have extensive economic impact, usually on the order of $100 million or more, or otherwise be of substantial public interest.

Once a work plan is approved, the second stage of the regulatory process begins: the preparation of a proposal. A project team is assigned for this task, and a docket is opened. The project team usually consists of the project manager and a project counsel, although in more complex projects additional individuals also participate.

The first task of the project team is to draft proposed regulations which would apply to the area of concern. The proposal may take two forms: an advance notice of proposed rulemaking (ANPRM) or a notice of proposed rulemaking (NPRM). An advance notice of proposed rulemaking is usually a tentative suggestion of possible approaches which might be taken in regulating an area of concern. Even though detailed specific proposals may be made at this step, an advance notice of proposed rulemaking is published solely to generate more informed comment regarding a specific issue. All comments received are carefully reviewed to determine whether there is sufficient cause and justification to proceed with further rulemaking. A notice of proposed rulemaking is published in lieu of an advance notice when the Coast Guard has a good idea of how the final rule should be stated.

There are various administrative laws and regulations which set forth the regulatory procedure that must be followed in preparing regulatory proposals. Basically, these laws and regulations say that the public must normally be given the opportunity to comment before a regulation can be made final and effective. There are very few exceptions to this rule.

Once the regulatory proposal is completed by the project team, it is sent out for internal Coast Guard clearance. Interested parties are given an opportunity to review and revise the proposal before it is published. When all required clearances have been received, the appropriate Coast Guard officer signs the proposal and it is printed in the Federal Register for public comment.

Because most people do not follow the daily Federal Register, the Coat Guard also publishes notice of regulatory actions in the Keynotes section of the Proceedings. By doing this, the Coast Guard is able to reach many more interested parties than it would if it adhered only to the requirement to publish in the Federal Register.

The comment period is a most important one. Parties view the proposed regulation for the first time and can tell the Coast Guard what they think. Responsive comment by the public, particularly by affected parties, is necessary if the final product is to be an effective, meaningful regulation. Comments are usually in the form of a written response to the proposal published in the Federal Register; however, public hearings may also be held to allow oral comments to be presented.

After comments have been received, they are analyzed in detail by the project team. After all applicable inputs have been reviewed and considered, the next stage is entered.

If the proposal was an advance notice of proposed rulemaking, a notice of proposed rulemaking is drafted. If the proposal was a notice of proposed rulemaking, a final rule is prepared. If a notice of proposed rulemaking receives sufficient negative comment, however, the Coast Guard may withdraw the proposal entirely or may amend the notice so extensively that another notice will be published and more public comment solicited. Most regulations are published first as notices of proposed rulemaking and then as final rules.

Once the final rule is prepared, it goes through the same screening process as the notice. It is more closely scrutinized during the review, however. All input in response to a notice of proposed rulemaking is seriously considered.

Once a final rule is signed by the Commandant or other appropriate official, the final regulation is published in the Federal Register. It should be noted that the project team drafts a preamble to accompany the regulation. In the preamble, the comments received after publication of a notice are discussed. It explains why some parts of the regulation were changed and why some were not. The thoughts and policy behind the regulation will be explained. It is a good idea to retain this part of the Federal Register, as this information will not be published in the Code of Federal Regulations.

Usually, the regulation will become effective thirty days after publication.

That is the regulatory process in a nutshell. The public should become familiar with the advance notice and notice stages and their respective comment periods. It cannot be emphasized too much: the greater the involvement of industry and other interested members of the public, the better the regulation that will be produced.

The following were published between October 21, 1980, and December 8, 1980:

Final rules: CGD 79-148 Electronic Relative Motion Analyzer (correction), October 30, 1980. CGD 78-041b Puget Sound VTS (correction), November 10, 1980. CGD 76-170a Casualty Reporting Requirements and CGD 76-170 Casualty Reporting Requirements (interim rule), November 24, 1980.

Proposed rules: CGD 78-027 Manning of Vessels, October 27, 1980. CGD 78-121 Aluminum Hatch Covers, October 27, 1980. CGD 76-193a Radar Observer Endorsement, November 6, 1980. CGD 79-081b Manning Levels for Foreign Tank Vessels, November 17, 1980 (see pertinent section of the Keynotes). CGD 77-084 Licensing of Pilots, November 28, 1980, corrected December 8, 1980 (see pertinent section of the Keynotes).

Notices: CGD 80-130 Omega Radionavigation System Change, November 6, 1980. CGD 80-062 Coast Guard Consumer Program, November 28, 1980.

Any questions regarding regulatory dockets should be directed to Commander A. D. Utara (G-CMC), U.S. Coast Guard Headquarters, 2100 Second St. SW, Washington, DC 20593; (202) 426-1477.

* * *

Revision of Electrical Regulations
CGD 74-125(A)

This regulation will constitute a general revision and updating of the electrical regulations to conform with the latest technology. It will include steering requirements for vessels other than tank vessels.

This revision is necessary because industrial standards for electrical engineering have changed in the past few years and the regulations must be brought up to date to reflect current industry practices.

An initial NPRM was published on June 27, 1977 (42 FR 32700). A supplemental NPRM was published as CGD 74-125A on March 3, 1980 (Part VII).

New Tank Barge Construction
CGD 75-083
Upgrade of Existing Tank Barge Construction
CGD 75-083a

This action comprises two regulatory projects centered on tank barge construction standards. These projects were the result of a Presidential initiative of March 17, 1977, directing a study of the tank barge pollution problem. One project will address new barge construction, while the other will pertain to existing barges. Joint public hearings were held, and regulatory documents for both will be published at the same time.

In July 1977 the Coast Guard began a reexamination of the tank barge construction standards. It was determined that new construction would be treated separately from existing barges. An ANPRM was then issued to gather additional data and assess impacts related to existing barges.

The new NPRM on tank barge construction, withdrawing the prior NPRM, and the ANPRM for existing tank barges were published as part VI of the Federal Register of June 14, 1979 (44 FR 34440 and 44 FR 34443, respectively).

Public hearings on the dockets were held as follows: August 2, 1979, Washington, DC; August 15, 1979, Seattle, Washington; August 23, 1979, New Orleans, Louisiana; September 5, 1979, Washington, DC; and September 7, 1979, St.

Louis, Missouri. The comments made at the hearings have been incorporated in the docket.

On Thursday, November 8, 1979, a Federal Register notice extended the comment period on the project. This extension was based on the continued public interest and ran to December 1, 1979.

A Supplementary Notice was published as Part III of the Federal Register of March 13, 1980 (44 FR 16438). This notice informs the public of a deferment in the rulemaking process for these dockets. The comments received have raised significant questions concerning these proposals. It was decided that the entire tank barge pollution problem warranted a carefully considered study by a recognized independent body. The National Academy of Sciences/ National Research Council will conduct the study. Part of the study, a two-day workshop, took place April 15 and 16, 1980. The study will be completed by the end of January 1981. The Coast Guard will defer any further rulemaking on these proposals until completion of the study, and the dates in the proposals of June 14, 1979, are no longer valid. If the Coast Guard should pursue further action on these proposals, a new timetable will have to be developed.

Anyone wishing to obtain copies of the rulemaking may do so by contacting Commander A. D. Utara, Marine Safety Council (address is given in the introduction to the Keynotes section).

Pollution Prevention, Vessels and Oil Transfer Regulations CGD 75-124a

This regulation will reduce accidental or intentional discharge of oil or oily wastes during vessel operations.

The basis of this regulation is threefold. First, there is the need to reduce the number and incidence of oil spills. Second, this regulation will help to clarify the existing rules. Finally, this regulation covers the additional requirement for oil-water separators under the 1973 International Convention for the Prevention of Pollution from Ships.

An NPRM was published on June 27, 1977 (42 FR 32670), and a supplemental NPRM was published on October 27, 1977 (42 FR 56625). Because of substantive changes in the regulation, there is currently no scheduled publication date for the final rule.

Segregated Ballast and Tank Cleaning Regulations CGD 77-058(b)

This regulation was initiated when President Carter directed the Secretary of Transportation to issue new rules for oil tanker standards which would include segregated ballast on all tankers and double bottoms on all new tankers which call at American ports. The provisions of these proposed regulations were changed by the February 1978 Intergovernmental Maritime Consultative Organization (IMCO) Conference to include Crude Oil Washing (COW) and Clean Ballast Tanks (CBT).

The NPRM was published on May 16, 1977 (42 FR 24868). As a result of the IMCO Tanker and Pollution Prevention Conference of February 1978, a new NPRM was issued on February 12, 1979 (44 FR 8984). Public hearings were then held in March in Washington, DC and San Francisco, California; 265 comments were received on the docket and analyzed. The final rules were published on June 30, 1980.

Construction and Equipment Existing Self-propelled Vessels Carrying Bulk Liquefied Gases CGD 77-069

These regulations will amend the current ones to include the substantive requirements of the "Code for Existing Ships Carrying Liquefied Gases in Bulk" adopted by the Intergovernmental Maritime Consultative Organization (IMCO). The use of liquefied gas has increased, as have the problems associated with it. Because of its unique properties and the dangers associated with them, new regulations are being drafted. The environmental impact statement and regulatory analysis were completed in February 1979, and an NPRM on these regulations is anticipated in April 1981.

Licensing of Pilots CGD 77-084

This regulation takes into account the problems caused by increased ship size and unusual maneuvering characteristics. The proposal will require recency of service for each route upon which a pilot is authorized to serve, licensing with tonnage limitations commensurate with pilot experience, and consideration of ship-handling simulator training for pilots of very large vessels. A regulatory analysis and work plan were completed in October 1978. The NPRM was published on November 28, 1980 (45 FR 79258), and corrected on December 8, 1980 (45 FR 80843). A calendar of scheduled public hearings appears at the end of the Keynotes.

Revision of 46 CFR 157.20-5 Division into Three Watch Regulation CGD 78-037

This revision will require an adjustment in vessel manning requirements to bring them into line with current legislation. It will change the requirements which identify personnel who must be used on the three watches and personnel who may be employed in a day working status. An NPRM formerly scheduled to be published on this docket in January 1980 has been deferred pending legislative action in Congress.

Tank Vessel Operations-- Puget Sound CGD 78-041

This regulation governs the operation of tank vessels in the Puget Sound area. It was initiated to reduce the possibility of environmental harm resulting from oil spills in Puget Sound. This is to be accomplished by governing the operation of tankers and reducing the risk of collision or grounding.

Former Secretary of Transportation Brock Adams signed a 180-day interim rule on March 14, 1978, prohibiting entry of oil tankers in excess of 125,000 deadweight tons in Puget Sound; this appeared in

the Federal Register of March 23, 1978 (43 FR 12257). An ANPRM was published on March 27, 1978 (43 FR 12840). An extension of the interim rule was published in the Federal Register in order to allow the Coast Guard adequate time to complete this rulemaking.

The public hearings scheduled for June 11 and 12 in Seattle, Washington, June 13 in Mt. Vernon, Washington, and June 14 in Port Angeles, Washington, have been completed, and all the comments received have been entered in the docket files for consideration. The extension of the interim navigation rule was published on June 21, 1979 (44 FR 36174). This extension became effective July 1 and will be in effect until the Coast Guard prints notice of its cancellation. A supplemental NPRM was published on July 21, 1980 (45 FR 48827). Copies of documents or the transcripts of the hearings may be obtained by writing to the Marine Safety Council. A final rule on the docket is currently expected in December 1981.

Personnel Job Safety Requirements for Fixed Installations on the Outer Continental Shelf CGD 79-077

This regulation is concerned with the health and safety requirements for installations engaged in oil field exploration and development. This action was mandated by pending Outer Continental Shelf (OCS) legislation. It will provide more comprehensive protection for personnel employed in vessels and installations in the oil trade.

Qualifications of the Person in Charge of Oil Transfer Operations, Tankerman Requirements CGD 79-116 and 79-116A

These regulations will redefine and establish qualifying criteria for the certifying of individuals engaged in the carriage and transfer of dangerous cargoes in bulk.

In has been found that most pollution incidents are the result of personnel error; consequently, the minimum qualifications of persons involved in handling polluting substances should be specified.

New NPRMs have been approved by the Secretary of Transportation and will be published in mid-December 1980. A calendar of scheduled public hearings appears at the end of the Keynotes.

Shipboard Noise Abatement Standards CGD 79-134

These standards will establish acceptable sound levels for each of the various vessel compartments based on the latest technology. The standards will differentiate acceptable sound levels for both existing vessels and new vessels, specify acceptable methods of compliance, and establish a hearing conservation program.

During the development of these standards, the U.S. Naval Ocean Systems Center (NOSC), San Diego, California, was contracted by the Coast Guard to evaluate sound levels aboard several U.S. merchant vessels, study the data obtained, and define the extent of the noise problem. NOSC was asked to use this data and other information available to recommend a set of noise levels to be included in the proposed standards for the control and/or elimination of the shipboard noise problem.

This study has been completed. Copies are available through the National Technical Information Service (NTIS), Springfield, Virginia 22161; request NOSC technical documents numbers 243, 254, 257, 267, and 405.

Personnel and Manning Standards for Foreign Vessels CGD 79-081(B)

This regulation, deemed necessary to reduce the probability of oil spills, will establish minimum manning levels for foreign tank vessels operating in U.S. navigable waters. It will also establish procedures for the verification of training, qualification, and watchkeeping standards. An NPRM was published in the Federal Register on November 17, 1980 (45 FR 75712).

Personnel Safety and Health Requirements for Industrial Vessels CGD 80-15

This regulation is similar to CGD 79-077 and covers vessels engaged in exploration, supply, and support on the Outer Continental Shelf (OCS). Inasmuch as the safety of the workers on construction vessels will be covered largely by CGD 79-065, Marine Personnel Safety Standards, this project has been withdrawn.

* * *

A complete listing of all Coast Guard proposed regulations, both "significant" and "non-significant," appeared in the Monday, August 25, 1980 Federal Register (45 FR 56538).

ANY COMPANIES OR INDIVIDUALS WISHING TO SPEAK AT PUBLIC HEARINGS SHOULD CONTACT LIEUTENANT DONALD M. JOHNSON, JR., (G-CMC), U.S. COAST GUARD HEADQUARTERS, 2100 SECOND ST. SW, WASHINGTON, DC 20593; (202) 426-1477. THE COAST GUARD HAS SCHEDULED THE FOLLOWING PUBLIC HEARINGS (ALL HEARINGS BEGIN AT 10:00 A.M.):

JANUARY 1981

14: CGD 77-084 Licensing of Pilots
Bond Court Hotel (Ritz Room)
777 St. Clair
Cleveland, Ohio

21: CGD 79-116 and 79-116A Qualifications of the Person in Charge of Oil Transfer Operations, Tankerman Requirements
Holiday Inn Downtown (Rooms 1 and 2)
2211 Market Street
St. Louis, Missouri

(Continued on page 165)

"Safe for workers" means "Safe for marine inspectors"

by

CDR Fred H. Halvorsen
Chief, Marine Safety School
U.S. Coast Guard Reserve Training Center
Yorktown, Virginia

LT Thomas J. Haas
Chief, Hazard Evaluation Branch
U.S. Coast Guard Headquarters
Washington, DC

In his article "The Marine Chemist and the Marine Safety Inspector" (Proceedings of the Marine Safety Council, Vol. 33, No. 4, April 1976, pp. 70-72), then Lieutenant Commander Fred H. Halvorsen pointed out that the importance the U.S. Coast Guard attaches to the marine chemists' expertise, knowledge, and experience is best illustrated by the fact that their inspection services are required by regulation. Commander John E. Lindak continued the theme in "Upgrading the Marine Chemist Program" (Proceedings of the Marine Safety Council, Vol. 35, No. 7, October 1978, pp. 100-102), where he discussed regulatory developments affecting National Fire Protection Association (NFPA) marine chemists and Coast Guard marine inspectors and further described improvements in the marine chemist program. The following article, adapted from a paper presented by Commander Halvorsen and Lieutenant Haas at the Twenty-Second Annual Marine Chemists' Association Seminar held in Boston, Massachusetts, July 13 - 16, 1980, is the third in the series. It focuses on the marine safety inspector's perception of the role played by the marine chemist and treatment of that role in safety courses for Coast Guard marine inspectors.

The Marine Chemist

Briefly put, the role of the marine chemist, as perceived by a Coast Guard safety inspector, is to evaluate and eliminate health, explosion, and fire hazards in marine industries. The chemist's job can be broken down into three areas: hazard identification, hazard evaluation, and hazard control.

Hazard Identification

There are certain hazards inherent in the maritime work environment that must be recognized, especially in confined space entry. Marine chemists, Coast Guard marine inspectors, and ship and shipyard workers are only a few of the individuals required to enter cargo tanks, void spaces, cofferdams, and pump rooms to carry out their duties.

The hazards associated with these operations include:

(1) oxygen deficiency;

(2) acute/chronic toxicity; and

(3) flammable/explosive atmospheres.

An atmosphere containing less than 16 percent oxygen is considered immediately dangerous to life (normal air contains 21 percent oxygen), and an atmosphere containing 16 to 19.5 percent oxygen is marginally supportive of human life. Variables such as the person's activity in the confined space, his age, weight, state of health, and his smoking habits may well determine the individual's ability to work and survive in an atmosphere with less than 21 percent oxygen without protective respiratory equipment.

A confined space can become oxygen-deficient in several ways:

(1) Oxygen in confined spaces may be depleted if corrosion is taking place.

(2) Spaces may be inerted. The oxygen that may have been present prior to inerting is replaced by the inerting gas. Inerting can be provided by a flue gas scrubber, an inert gas generator, or a nitrogen tank.

(3) Certain cargoes or residues of cargoes, such as scrap iron, fresh fruit, molasses, and various drying oils, absorb oxygen. The tanks then may not contain sufficient oxygen to support life.

(4) Tanks which have been coated with preservatives or other materials require oxygen for the curing process and thus deplete the oxygen supply.

Toxic vapors in tanks and spaces may result in immediate death or injury; this is referred to as acute toxicity. High concentrations of toxic vapors are immediately dangerous to life, and one breath of some vapors could render a person helpless instantly. Even after the cargo is completely offloaded, the residue left in the tank may vaporize, causing high airborne concentrations of the cargo.

Many toxic cargoes in low vapor concentrations may not have an immediate effect. Repeated exposure to low concentrations of certain chemical vapors may produce harmful effects that wll not become apparent for years afterward. This is termed chronic toxicity. Exposure to certain chemicals may lead to cancer. Exposure to vinyl chloride, for example, may lead to liver cancer; exposure to benzene vapors may lead to leukemia.

A tank atmosphere that is extremely flammable may yet contain sufficient oxygen and not be toxic. The hazard in this case is the possibility of fire and explosion; the tank is considered to be "safe for

workers--not safe for hot work." If the atmosphere of the tank is within the flammability limits of the chemical vapor in question, the tank may be entered; extreme caution must then be exercised. The tank should be ventilated until the vapor concentrations are well below the lower explosive level (LEL). Ten percent below the LEL is the recommended level.

Hazard Evaluation

The marine chemist is perceived as being the leading expert in this area. The coastguardsman assumes that when a certificate is placed on a confined space and it states "safe for workers," IT IS. He also assumes that if the marine chemist's present equipment or techniques are insufficient, he will quickly improve them or will not certify the confined space as safe.

To evaluate the total magnitude of the environmental factors and stresses existing in a confined space, appropriate instruments must be used to measure the hazards. Sampling is performed to identify contaminants present and their sources, determine the amount of worker exposure, and measure the effectiveness of controls installed to minimize exposure.

The type of monitoring instrument used depends on the strategy employed. Samples may be taken to obtain an area average concentration or may be taken at breathing zones to obtain a worker exposure concentration. The chemicals to be monitored, the duration of sampling, and the type of standards to which the result will be compared will determine the choice of instrument. There are two basic types of monitoring instruments, real-time and continuous. The first type, real-time--also called short-time or grab--, employs a glass syringe, hand-held pump, or squeeze bulb to draw a sample through impregnated filter paper, or a gas detection tube. Direct reading instruments (electronic sensors) also yield short-time readings. The second type, continuous--also called long-term--, employs bubblers with reactive or absorbing solutions, adsorption tubes, or slowly reacting gas detection tubes. An air sample is slowly drawn through the bed of adsorption tubes filled with silica gel or charcoal to "trap" the chemical of interest.

After the sampling has continued for a specific period of time, the collected material is desorbed and channeled through an analytical instrument such as a gas chromatograph, infrared analyzer, or other device yielding quantitative results. Additionally, qualitative detection of some gases and vapors may be obtained by indicator badges designed to be worn on the individual. These badges either change color upon exposure to the substance or can be subsequently analyzed in a laboratory. The radiation badge used in hospital X-ray rooms was a prototype for these gas and vapor badges.

Another relatively new method of monitoring toxic gases uses chemically impregnated paper tapes which carry color-producing reagents on an almost completely dry strip of filter paper to conduct spot testing. Continuous monitoring may be performed by pulling the impregnated paper tape through an optics block (after a metered sample of gas has been drawn over it) to read the concentration of the detected gas.

Once an evaluation has been performed, a comparison with certain standards is made to ascertain safety. Regulations such as those of the Coast Guard and OSHA, NFPA 306, and the Threshold Limit Values guide are among the standards usually relied upon. The Coast Guard marine safety inspector expects all standards to have been met before the chemist issues his certificate.

One thing must be said generally about detection instrumentation: there is no one instrument which can measure every substance of interest. Each instrument has inherent limitations (i.e., calibration, cost, and the analytical methodology employed). Also, the work practice, the precision necessary to make a comparison with a standard, and time, among other factors, must always be taken into account when a device is being selected.

Hazard Control

The Coast Guard marine safety inspector probably relies more on the marine chemist's certificate than any other control measure to ensure his own safety and health. With this in mind, the marine chemist can understand why the coastguardsman may question him, sometimes to an extreme, if there is any doubt regarding the condition of an enclosed space or an ambiguous certificate, He is not trying to "hassle" the marine chemist; in most cases, he is interested in his own safety.

Corrective measures, when necessary to protect health and safety, are based on the marine chemist's experience, knowledge, and corrected quantitative data and are aimed at eliminating, controlling, or reducing the hazards identified.

Marine chemists, the Coast Guard, and the maritime industry have three general means of control: engineering, administration, and personnel protection.

The classical industrial-hygiene means of engineering control include:

(1) Substitution--toxic material, equipment, or processes that create hazardous exposure can often be replaced to reduce the exposure potential;

(2) Isolation--a material, process, or operation can be isolated physically to eliminate or reduce hazardous exposure;

(3) Enclosure--an entire process or portion can be enclosed to prevent the release of contaminants into the working environment;

(4) Local exhaust ventilation--toxic substances released into a work area can be effectively controlled by means of exhaust ventilation applied at a point as close to the source of emission as possible;

(5) Dilute ventilation--ventilation can be provided to dilute low-toxicity solvent vapors;

(6) Wet method--water can be added to reduce dusting when friable material is handled and the water does not interfere with the process.

A vapor control seminar was jointly sponsored by the Coast Guard and the Environmental Protection Agency in December 1978. It provided a forum for an exchange of technical ideas regarding the effectiveness and safety of vapor recovery applied to barges and tankships. For some cargoes with special hazards, the following engineering controls are being contemplated.

(1) Requiring cargo tank segregation from the sea;

(2) Changing present gauging requirements from open to closed;

(3) Requiring B/3 vent heights or vent heights of three meters, whichever is greater, for tankships;

(4) Requiring 3.6-meter vent heights for tank barges; and

(5) Purging cargo lines with water or an inert gas prior to disconnecting.

Administrative controls include:

(1) Limiting the number of people in a work area;

(2) Limiting the number of hours spent performing a single function;

(3) Good housekeeping; and

(4) Training.

Use of the marine chemist's certificate (an additional administrative control) can minimize both acute and chronic hazards found in confined spaces.

Personnel protection includes:

(1) The wearing of protective clothing, gloves, hard hats, and shoes; and

(2) The use of respirators:

(a) emergency escape breathing apparatus;

(b) self-contained breathing apparatus; and

(c) intermediate levels of respiratory protection (i.e., filters, half- and full-mask devices).

The marine chemist's certificate is in itself an important administrative control, as stated above, but it can also include important engineering control recommendations, such as ventilation to be employed to minimize or eliminate hazards. Personnel protective equipment recommendations may also be included where appropriate, The coastguardsman expects the engineering and personnel protection controls on the certificate along with all appropriate signatures and a recertification in 24 hours, if necessary.

The Coastguardsman

The formal training of Coast Guard Marine Safety personnel is undertaken at the Marine Safety School, U.S. Coast Guard Reserve Training Center, Yorktown, Virginia. Both officers and petty officers are given introductory, intermediate, and some advanced level training at Yorktown in all aspects of their assignments over the span of their marine safety careers. Less formalized training and on-the-job training is given on a continuous basis at each field office.

MESPOC

At the Marine Safety School, introductory training for petty officers is given in the five-week Marine Environment and Systems Petty Officer Course (MESPOC). The petty officer is given a basic introduction to regulations, Coast Guard policy and practices, pollution response, and basic personal safety. Basic personal safety includes a definition of hazardous respiratory environments, such as oxygen deficiency or the presence of flammable and/or toxic vapors. The petty officer is also introduced to vapor and gas measuring devices. The primary emphasis of the course is personal safety when boarding vessels and especially when entering pumprooms on petroleum tank vessels. Introductory training is also given in the area of emergency response to discharges of oil and hazardous substances; this section includes contact protection (protective clothing), vapor/gas hazards, and measurement devices.

MSBIC

Introductory training for junior and mid-grade officers and a few specially selected senior petty officers is given in a 12-week resident course, the Marine Safety Basic Indoctrination Course (MSBIC). This course covers all aspects of the Coast Guard's Marine Safety Program and emphasizes commercial vessel inspection, port safety and law enforcement, and oil pollution and hazardous substance response. Basic personal safety information is included throughout the course, but the emphasis is on safe entry into below-decks spaces during routine Coast Guard biennial commercial ship and barge inspections. An introduction to emergency response is also given, including the subjects of respiratory protection, contact protection, and measurement devices. For MSBIC students, entry into below-decks spaces is covered in approximately three hours of lectures. The student is introduced to the NFPA 306 Standard, the OSHA 29 CFR 1915 Standard, and Coast Guard policy regarding the use of these standards. The personal safety aspects of the standards are emphasized. The point is made that the OSHA tank entry standards are applicable to Coast Guard marine inspectors working in a shipyard environment, i.e., the OSHA competent person can certify a space as safe if the tank last contained flammable or combustible vapors or is a potentially oxygen-deficient environment. As indicated by 29 CFR 1915(b), the competent person cannot certify a space as safe for entry if the tank last contained corrosives or toxic materials.

For hot work, the marine inspector is made cognizant of the fact that only an NFPA-certified marine chemist can make the determination that hot work can be done safely under both the requirements of 29 CFR 1915 and the NFPA 306 Standard (46 CFR 35.01) adopted (by reference) by the Coast Guard. The marine inspector is made aware of the fact that the NFPA marine chemist can be replaced in only two instances:

(1) If, in a port area under Coast Guard jurisdiction (nominally a U.S. port), the services of a marine chemist are not reasonably available, the Coast Guard Officer in Charge, Marine Inspection, can select an individual to function in the stead of a marine chemist on a one-time basis only. This is done only on an extremely limited basis. The authors are aware of this being done on a routine basis only in Alaska, where competent persons are routinely permitted to function as marine chemists under 46 CFR 35.01-1(c)(1).

(2) Under 46 CFR 35.01-1(c)(2), a marine chemist can be replaced at sea, and the senior officer present can certify a tank as gas-free.

Coast Guard policy regarding the proper receipt and signature of a responsible shipyard employee is also discussed. Basically, if a shipyard representative does not countersign and acknowledge receipt of the marine chemist's certificate, the certificate is not acceptable. During this three-hour period, the marine inspector is apprised of the fact that the historical function of a marine chemist was to limit or prevent

fire and explosion on tank vessels carrying combustible and flammable liquids. The Coast Guard, however, has come to depend on the marine chemist to provide toxicological testing in a confined space a marine inspector may have to enter. It is thus incumbent on Coast Guard personnel to be vitally aware of, and concerned with, the marine chemist's duties and responsibilities. The point is emphasized that it is best for the inspector to make his inspection as soon after the tank is certified gas-free as possible. During the period, three accidents are discussed at length with the students. The first accident involves the death of a Coast Guard warrant officer in a below-decks space in 1974. This death was caused by simple oxygen deficiency in a confined space. There was not a current marine chemist's certificate on the barge, nor had a competent person checked the space prior to entry. The second accident discussed is the 1975 Greenville accident, where a marine chemist and three shipyard workers died in a barge explosion while doing hot work. The third accident occurred while hot work was being performed on a barge containing crude oil residues. Neither a marine chemist nor a competent person had checked the barge, and the resultant explosion killed two, injured ten, and caused over $1 million damage.

HCTC

More advanced training of officers and petty officers in all aspects of the transportation of hazardous materials is given in the three-week Hazardous Chemicals Training Course (HCTC). In the area of marine chemist information, the OSHA and NFPA standards and designations are reviewed and discussed. Additionally, about six hours are spent discussing general chemical hazards, (including vapor-liquid equilibria), basic toxicology, specialized emergency response techniques, and the use of protective equipment. Hands-on training is given with vapor/gas measuring devices, protective clothing, and various types of respirators. Students are also taught the basics of respirator selection and care and maintenance of respirators and detection/measurement devices.

Conclusions

The purpose of this article was to establish and strengthen the professional relationship between the Coast Guard marine inspector and the NFPA marine chemist. On the Coast Guard side, it has been recommended at the Marine Safety School in Yorktown that the local Coast Guard Marine Inspection Offices invite the marine chemists who practice in their areas to speak to a meeting of Coast Guard personnel. Traditionally, a bimonthly "payday" meeting is held at Marine Safety Offices, and guest speakers are often invited to address the assembled group. At this meeting, the marine chemist could explain his testing procedure, demonstrate the use of his test apparatus, discuss what is entailed in a "Safe for workers" or "Safe for hot work" designation, review the conditions he insists upon before he will issue a gas-free certificate, and discuss the various operations in the area.

The Coast Guard also recommends that its personnel make an attempt to view the marine chemist during an actual inspection. The idea is not to judge the adequacy of the inspection, but merely to see what the marine chemist does. If Coast Guard personnel have questions regarding the inspection, they are encouraged to ask them. Questions by Coast Guard personnel should be regarded as curiosity rather than as an indictment of the marine chemist's methods.

Insofar as action by the marine chemist is concerned, the Coast Guard recommends that marine chemists plan to routinely meet with Coast Guard personnel to discuss methods, techniques, and inspections. If a marine chemist meets Coast Guard personnel in the field, the Coast Guard recommends that he introduce himself and explain what he is doing. Any information is appreciated--personal safety is a topic everyone is interested in. ‡

Keynotes (from page 161)

27: CGD 77-084 Licensing of Pilots
Nassif Building (DOT)
(Room 2232)
7th & D Streets SW
Washington, DC

FEBRUARY 1981

3: CGD 77-084 Licensing of Pilots
International Hotel
(French Room)
300 Canal Street
New Orleans, Louisiana

4: CGD 79-116 and 79-116A Qualifications of the Person in Charge of Oil Transfer Operations, Tankerman Requirements
International Hotel
(French Room)
300 Canal Street
New Orleans, Louisiana

10: CGD 77-084 Licensing of Pilots
Holiday Inn Financial District (Lotus Room)
750 Kearny Street
San Francisco, California

18: CGD 79-116 and 79-116A Qualifications of the Person in Charge of Oil Transfer Operations, Tankerman Requirements
Queen Mary Hotel (King's Grill)
Pier J
Long Beach, California

25: CGD 79-116 and 79-116A Qualifications of the Person in Charge of Oil Transfer Operations, Tankerman Requirements
Nassif Building (DOT)
(Room 2232)
7th and D Streets SW
Washington, DC ‡

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Statistics of Casualties 1979

The U.S. Coast Guard annually presents a statistical summary of commercial vessel casualties that were investigated by Coast Guard marine inspectors during the previous fiscal year. The public, industry, and the Coast Guard have used the findings of these investigations to establish standards and determine the need for legislation to improve the protection of safety of life and property at sea.

The master of a vessel is required by law to report a marine casualty as soon as possible after its occurrence to the Coast Guard Officer in Charge, Marine Inspection. Casualties involving commercial vessels are required to be reported to the Coast Guard whenever the casualty results in any of the following:

(a) actual physical damage to property in excess of $1,500;

(b) material damage affecting the seaworthiness or efficiency of a vessel;

(c) stranding or grounding (with or without damage);

(d) loss of life;

(e) injury causing any person to remain incapacitated for a period in excess of 72 hours, except injury to harbor workers not resulting in death and not resulting from vessel casualty or vessel equipment casualty.

The statistical summary on the following pages represents casualties to commercial vessels which meet the above criteria. It is important to note that the summary represents casualties reported to Coast Guard Headquarters in fiscal year 1979, which ended September 30, 1979. Statistics concerning noncommercial recreation boating accidents will be published separately in a future issue of the Proceedings.

This summary also includes those casualties serious enough by reason of dollar damage or death/injury to personnel to warrant the convening of a Marine Board of Investigation (specifically, the collision between the USCG CUYAHOGA and the Argentine M/V SANTA CRUZ on Chesapeake Bay, which resulted in the loss of 11 lives).

Every event involving a vessel or her personnel which meets any of the conditions of a reportable casualty is of great concern to the Coast Guard. A number of reportable casualties are not investigated by the Coast Guard each year simply because they are not reported. Thus it is of primary importance that the masters of all vessels ensure that all casualties are reported and investigated. With the cooperation of the masters, owners, and agents of commercial vessels, many of the unreported casualties can be investigated.

This statistical tabulation is intended to summarize the casualty experience for the entire commercial fleet. Because this summary is so all-encompassing, the use of the statistics may lead to erroneous conclusions unless the limitations of the data are well understood.

The Information and Analysis Staff of the Office of Merchant Marine Safety will gladly assist in quantifying those limitations for each specific need. Comments and recommendations for changes or improvements to these statistics should be addressed to the Commandant (G-MA/16), U.S. Coast Guard, Washington, DC 20593.

Casualties to Commercial Vessels

October 1, 1978, to September 30, 1979 Fiscal Year 1979	Collisions: crossing, meeting and overtaking	Collisions while anchored, docking, or undocking	Collision, fog	Collisions with piers and bridges	Collisions; all others	Explosion and/or fire—cargo	Explosion and/or fire—vessel's fuel	Explosion and/or fire—pressure vessels, boilers	Explosion and/or fire—structure, equipment, all others	Grounding with damage to vessel	Grounding without damage to vessel	Founderings, capsizings, and floodings	Heavy weather damage	Cargo damage	Material failure—structure and equipment	Material failure—machinery and engineering equipment	Casualty not otherwise classified	Total
Number of casualties	337	313	10	650	371	4	9	7	199	430	755	547	1	3	332	540	157	4665
Number of vessels involved	1003	893	26	1280	633	4	13	7	207	722	1282	673	1	3	359	547	506	8159
Number of inspected vessels involved	285	256	8	395	222	-	.....	7	50	201	430	78	1	3	216	229	83	2464
Number of uninspected vessels involved	718	637	18	885	411	1	13	.....	157	521	852	597	.....	1	143	318	423	5695
PRIMARY CAUSE																		
Personnel fault:																		
Pilots—State	17	19	.....	36	4	.....	.....	.....	.....	9	51	2	.....	.....	.....	.....	1	139
Pilots—Federal	4	8	.....	20	3	.....	.....	.....	.....	10	22	1	.....	.....	.....	.....	1	69
Licensed officer—Documented seaman	168	144	4	368	129	.....	1	.....	4	197	275	48	.....	.....	13	6	23	1380
Unlicensed—Undocumented persons	80	47	3	32	39	.....	1	.....	6	78	87	42	.....	.....	1	.....	18	430
All others	12	20	1	39	13	1	.....	.....	10	10	26	14	.....	2	8	2	19	177
Calculated risk	.....	.....	.....	2	2	.....	.....	.....	.....	.....	2	.....	.....	.....	5	.....	.....	11
Restricted maneuvering room	2	2	.....	3	.....	.....	.....	.....	.....	2	3	.....	.....	.....	.....	.....	1	13
Storms—adverse weather	8	8	2	15	34	.....	.....	.....	1	26	31	64	.....	1	84	3	18	295
Unusual currents	1	2	.....	9	.....	.....	.....	.....	.....	4	3	4	.....	.....	.....	1	1	25
Sheer, suction, bank cushion	4	1	.....	.....	1	.....	.....	.....	.....	3	9	1	.....	.....	1	.....	.....	20
Depth of water less than expected	.....	.....	.....	3	3	.....	.....	.....	.....	18	143	.....	.....	.....	.....	.....	.....	167
Failure of equipment	19	46	.....	64	31	2	4	6	79	44	59	75	1	.....	147	585	23	1105
Unseaworthy—lack of maintenance	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	.....	.....	.....	6
Floating debris—submerged object	.....	.....	.....	4	65	.....	.....	.....	.....	7	5	23	.....	.....	9	1	4	110
Inadequate tug assistance	.....	3	.....	9	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15
Fault on part of other vessel or person	665	581	16	643	286	.....	4	.....	8	299	533	211	.....	.....	65	9	243	3543
Unknown—insufficient information	22	11	.....	33	40	1	3	1	99	15	37	183	.....	.....	28	20	154	645
VESSEL TYPE																		
Inspected vessels:																		
Passenger and ferry—large	3	5	.....	6	2	.....	.....	.....	2	.....	6	2	.....	.....	-	9	2	38
Passenger and ferry—small	23	19	.....	9	12	.....	.....	.....	12	25	8	22	.....	.....	1	38	2	177
Freight	57	68	3	95	69	1	.....	2	13	28	70	27	1	2	108	97	23	664
Cargo Barge	16	14	.....	22	25	.....	.....	.....	.....	10	27	3	.....	.....	9	2	2	130
Tankship	15	36	.....	37	20	.....	.....	5	11	15	63	4	.....	.....	59	73	13	351
Tank Barge	161	92	5	217	81	2	.....	.....	5	114	256	12	.....	.....	18	1	37	981
Public	3	8	.....	.....	2	.....	.....	.....	2	.....	.....	.....	.....	.....	3	1	2	21
Miscellaneous	7	14	.....	9	31	.....	.....	.....	5	9	.....	6	.....	.....	11	8	2	102
Uninspected vessels:																		
Fishing	103	93	6	20	66	1	4	.....	74	118	145	259	.....	.....	83	256	35	1272
Tug/Towing	323	217	5	498	186	.....	7	.....	47	223	368	139	.....	.....	32	20	38	2109
Foreign	60	120	4	86	41	.....	.....	.....	15	34	112	4	.....	.....	10	23	29	558
Other	212	207	3	274	118	.....	2	.....	21	146	227	195	.....	1	18	11	321	1756
GROSS TONNAGE																		
300 tons or less	529	455	16	514	341	1	11	.....	140	351	504	520	.....	1	136	339	214	4072
Over 300 to 1,000 tons	281	151	6	328	94	.....	.....	.....	21	196	307	117	.....	.....	28	13	192	1648
Over 1,000 to 10,000 tons	180	156	4	291	133	3	2	.....	22	119	283	29	.....	.....	66	52	58	1398
Over 10,000 tons	93	131	4	147	65	.....	.....	7	24	56	188	7	1	2	129	144	50	1048
LENGTH																		
Less than 100 feet	435	381	12	397	267	1	9	.....	120	295	424	457	.....	.....	189	318	190	3415
100 to less than 300 feet	449	320	6	676	266	2	4	.....	52	348	615	204	.....	1	82	66	257	3328
300 to less than 500 feet	35	55	4	47	30	.....	.....	.....	8	26	56	3	.....	.....	27	13	16	320
500 feet and over	84	137	4	160	70	1	.....	7	27	53	187	9	1	2	141	170	62	1096
AGE																		
Less than 10 years	471	371	10	524	290	1	5	2	72	307	534	167	1	1	148	203	147	3254
10 to less than 20 years	280	295	6	348	126	2	4	1	45	202	319	167	.....	1	75	67	119	1996
20 to less than 30 years	93	125	.....	179	68	1	2	3	28	98	188	190	.....	1	48	74	57	1085
30 years and over	159	192	10	229	149	.....	2	1	62	115	242	218	.....	.....	60	183	183	1834

Casualties to Commercial Vessels -- Continued

October 1, 1978, to September 30, 1979 Fiscal Year 1979	Collisions; ovestrike, meeting and overtaking	Collisions while anchored, docking, or underway	Collision, tug	Collisions with piers and bridges	Collisions: all others	Explosion and/or fire—cargo	Explosion and/or fire—vessel's fuel	Explosion and/or fire—pressure vessels, boilers	Explosion and/or fire—structure, equipment, all others	Grounding with damage to vessel	Grounding without damage to vessel	Founderings, capsizings, and floodings	Heavy weather damage	Cargo damage	Material failure—structure and equipment	Material failure—machinery and engineering equipment	Casualty not otherwise classified	Total
LOCATION OF CASUALTY																		
Inland—Atlantic	36	53	1	110	61	.....	0	0	48	84	217	74	.....	.....	48	85	57	896
Inland—Gulf	160	114	3	191	89	0	0	.....	45	90	299	109	.....	1	23	31	59	1139
Inland—Pacific	20	28	1	41	42	.....	0	.....	16	39	84	47	.....	.....	58	47	6	410
Ocean—Atlantic	6	13	0	14	34	1	1	.....	12	28	89	77	.....	.....	84	104	39	410
Ocean—Gulf	29	19	.....	11	51	.....	1	.....	22	38	18	57	.....	.....	19	18	6	306
Ocean—Pacific	14	11	0	11	18	1	1	0	20	40	33	79	1	2	76	199	10	511
Great Lakes	5	11	.....	44	24	.....	.....	1	4	24	26	7	.....	.....	20	47	0	251
Western Rivers	51	44	1	183	38	.....	.....	.....	19	89	179	85	.....	.....	5	4	32	732
Ocean—other	3	13	.....	18	15	.....	.....	1	0	4	19	0	.....	.....	16	16	4	111
Foreign waters	1	3	.....	2	3	.....	.....	.....	.....	3	5	1	.....	.....	2	1	.....	30
TIME OF DAY																		
Daylight	168	185	7	351	180	3	4	4	101	178	383	240	1	3	991	341	78	3473
Nighttime	153	165	3	330	148	1	3	3	89	104	318	190	.....	1	78	148	61	1706
Twilight	19	32	.....	49	45	.....	0	.....	16	48	84	98	.....	.....	53	53	30	432
ESTIMATED LOSSES (IN THOUSANDS OF DOLLARS)																		
Vessel	23670	10175	4446	16103	9055	125	4221	599	41212	23078	494	44331	0	.....	9475	9883	16459	229722
Cargo	780	1238	388	3834	437	.....	.....	.....	1385	927	13	15136	.....	54	1946	130	22323	48172
Property	3718	13511	110	34433	1485	0	.....	.....	3319	1399	61	1900	.....	.....	339	348	3140	62400
VESSELS TOTALLY LOST																		
Inspected	2	.....	.....	.....	1	.....	.....	.....	4	2	.....	15	.....	.....	1	.....	4	29
Uninspected	18	17	0	7	13	1	1	.....	36	33	1	159	.....	.....	4	.....	9	301

Death/Injuries Due to a Vessel Casualty

October 1, 1978, to September 30, 1979 Fiscal Year 1979	Collisions; ovestrike, meeting and overtaking	Collisions while anchored, docking, or underway	Collision, tug	Collisions with piers and bridges	Collisions: all others	Explosion and/or fire—cargo	Explosion and/or fire—vessel's fuel	Explosion and/or fire—pressure vessels, boilers	Explosion and/or fire—structure, equipment, all others	Grounding with damage to vessel	Grounding without damage to vessel	Founderings, capsizings, and floodings	Heavy weather damage	Cargo damage	Material failure—structure and equipment	Material failure—machinery and engineering equipment	Casualty not otherwise classified	Total
Number of casualties	39	7	2	0	8	3	1	1	24	4	3	10	.....	.....	11	8	0	101
Number of inspected vessels involved	7	1	.....	0	2	2	.....	1	4	.....	.....	3	.....	.....	7	5	.....	35
Number of uninspected vessels involved	17	6	2	0	7	.....	1	.....	20	4	3	54	.....	.....	4	3	6	130
Number of persons deceased/injured	58/21	4/6	1/1	0/12	8/19	3/1	/1	/1	33/30	6/4	3/2	104/12	.....	.....	0/8	4/5	5/2	199/116
PRIMARY CAUSE																		
Personnel fault:																		
Pilots—State	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Pilots—Federal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Licensed officer—Documented seaman	0	0	.....	0	1	.....	.....	.....	1	1	.....	5	.....	.....	.....	1	.....	21
Unlicensed—Undocumented persons	0	2	.....	.....	2	.....	.....	.....	1	1	1	10	.....	.....	.....	.....	.....	25
All others	.....	.....	.....	.....	.....	1	.....	.....	4	.....	.....	.....	.....	.....	1	.....	.....	6
Calculated risk	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Restricted maneuvering room	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Storm—adverse weather	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	0	.....	.....	.....	.....	0	13
Unusual currents	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	4

Deaths/Injuries Due to a Vessel Casualty -- Continued

October 1, 1978, to September 30, 1979 Fiscal Year 1979	Collisions crossing, meeting and overtaking	Collisions while anchored, docking, or unmooring	Collision, tug	Collisions with piers and bridges	Collisions all others	Explosion and/or fire--cargo	Explosion and/or fire--vessel's fuel	Explosion and/or fire--pressure vessels, boilers	Explosion and/or fire--structure, equipment, all others	Grounding with damage to vessel	Grounding without damage to vessel	Founderings, capsizings, and floodings	Heavy weather damage	Cargo damage	Material failure--structure and equipment	Material failure--machinery and engineering equipment	Casualty not otherwise classified	Total
Sheet, suction, bank cushion	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Depth of water less than expected	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Failure of equipment	.....	.....	.....	1	1	1	1	.....	7	.....	1	1	.....	.....	7	4	1	24
Unseaworthy--lack of maintenance	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Floating debris--submerged object	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Inadequate tug assistance	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Fault on part of other vessel or person	8	1	0	.....	2	.....	.....	.....	.....	.....	.....	5	.....	.....	.....	.....	.....	16
Unknown--insufficient information	.....	.....	.....	1	1	1	.....	1	11	1	1	26	.....	.....	3	3	3	51
VESSEL TYPE																		
Inspected vessels:																		
Passenger and ferry--large	/1	.....	.....	1/3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	/1	.....	1/10
Passenger and ferry--small	1/3	2/	.....	.....	/3	.....	.....	.....	.....	.....	.....	/1	.....	.....	.....	1/	.....	4/7
Freight	/3	.....	.....	.....	.....	1/	.....	.....	4/6	.....	.....	.....	.....	.....	2/	/1	.....	8/9
Cargo Barge	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0/0
Tankship	1/	.....	.....	.....	.....	.....	.....	/1	.....	.....	.....	.....	.....	.....	/3	/3	.....	1/8
Tank Barge	.....	.....	.....	.....	.....	2/1	.....	.....	.....	.....	.....	.....	.....	.....	/1	.....	.....	2/2
Public	/3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	/3
Miscellaneous	.....	.....	.....	.....	.....	.....	.....	.....	/2	.....	.....	1/	.....	.....	1/1	.....	.....	2/3
Uninspected vessels:																		
Fishing	/2	/3	/1	.....	4/1	.....	.....	.....	3/6	0/4	1/1	77/4	.....	.....	.....	/1	1/	92/23
Tug/Towing	/4	2/	.....	1/4	1/3	.....	/1	.....	3/5	.....	1/1	13/3	.....	.....	.....	.....	.....	19/21
Foreign	1/	.....	.....	.....	.....	.....	.....	.....	7/8	.....	.....	.....	.....	.....	1/1	.....	1/1	10/10
Other	21/7	/3	1/	.....	1/3	.....	.....	.....	7/3	.....	.....	14/4	.....	.....	1/2	3/	3/1	51/25
PARTICULARS OF PERSON DECEASED/INJURED																		
Papers of deceased/injured:																		
License--Coast Guard	1/5	2/	.....	/3	/3	.....	.....	/1	/3	.....	.....	5/3	.....	.....	.....	/3	.....	8/19
Document--Coast Guard	/3	.....	.....	.....	.....	.....	.....	.....	/3	.....	.....	2/1	.....	.....	1/4	.....	/1	3/11
No license or document	22/13	2/8	1/1	2/10	0/9	3/1	/1	.....	10/17	0/4	2/2	97/9	.....	.....	5/4	4/2	4/	170/79
Other--unknown--foreign	1/	.....	.....	.....	.....	.....	.....	.....	7/9	.....	.....	.....	.....	.....	.....	.....	1/1	9/9
Status or capacity on vessel:																		
Passenger	7/9	/2	1/	/8	/5	.....	.....	.....	/1	/1	.....	4/	.....	.....	.....	1/1	2/	15/30
Longshoreman--harbor worker	.....	.....	.....	/1	.....	3/	.....	.....	3/	.....	.....	.....	.....	.....	3/1	.....	.....	9/2
Crewmember	17/13	2/3	/1	1/5	0/7	.....	/1	/1	19/23	0/3	2/2	90/12	.....	.....	2/6	/4	3/2	157/81
Other	.....	2/1	.....	1/	.....	/1	.....	.....	1/8	.....	.....	1/	.....	.....	1/1	3/	.....	9/9
Activity engaged in:																		
Off duty	4/2	/3	.....	.....	2/2	.....	.....	.....	10/4	.....	.....	5/	.....	.....	.....	.....	.....	21/10
Deck department duties	6/9	1/1	.....	/3	3/3	.....	/1	.....	7/8	/1	1/3	14/6	.....	.....	2/3	3/1	1/1	38/39
Engine department duties	2/	.....	.....	.....	.....	.....	.....	/1	/8	.....	.....	.....	.....	.....	1/	/3	.....	4/10
Steward department duties	.....	.....	.....	/1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	/1
Handling cargo	.....	.....	.....	.....	.....	1/	.....	.....	.....	.....	.....	.....	.....	.....	2/1	.....	.....	3/1
Fishing	4/	2/1	.....	.....	.....	.....	.....	.....	.....	3/1	.....	22/3	.....	.....	.....	.....	.....	31/4
Drills	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	/4	.....	.....	/4
Passenger	5/9	/3	1/	/8	/5	.....	.....	.....	/1	/3	.....	3/	.....	.....	.....	1/1	3/	12/38
Other and unknown	2/2	1/	/1	2/	1/3	3/1	.....	.....	8/11	3/1	1/	60/4	.....	.....	1/	.....	2/1	81/23
Location of vessel:																		
Great Lakes	.....	.....	.....	.....	.....	.....	.....	.....	7/4	.....	.....	.....	.....	.....	.....	.....	.....	7/4
Western Rivers	7/8	2/	.....	1/1	2/2	.....	.....	.....	1/1	.....	.....	7/1	.....	.....	.....	.....	.....	20/13
Inland	15/12	/5	/1	1/11	1/10	2/1	/1	/1	14/24	3/3	2/2	63/8	.....	.....	3/6	3/3	4/1	111/88
Oceans	.....	2/1	1/	.....	2/	.....	.....	.....	/1	.....	.....	34/2	.....	.....	/3	1/2	1/	42/8
Foreign and other	2/1	.....	.....	.....	.....	1/	.....	.....	1/	3/2	.....	/1	.....	.....	2/	.....	/1	10/5
PART OF BODY INVOLVED																		
Head	9/7	/1	/1	.....	/3	.....	.....	.....	2/6	.....	1/1	/3	.....	.....	2/3	3/1	/1	17/26
Back	/1	.....	.....	/3	/5	.....	.....	.....	/1	.....	/1	/1	.....	.....	.....	.....	.....	/12
Chest	/8	.....	.....	/1	/1	/1	.....	.....	/1	.....	.....	1/	.....	.....	/3	.....	.....	1/14
Extremities	/8	/1	.....	/5	.....	.....	/1	/1	/13	/3	.....	/3	.....	.....	/3	/3	.....	/33
Illness	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1/	.....	1/
Drowning	13/	4/	1/	2/	2/	1/	.....	.....	6/	0/	1/	100/	.....	.....	1/	.....	0/1	146/1
Unspecified and miscellaneous	2/3	/4	.....	/3	1/3	2/	.....	.....	10/10	/2	.....	3/7	.....	.....	1/1	/1	1/	25/33

Deaths on Board Commercial Vessels Not Involving a Vessel Casualty

October 1, 1978, to September 30, 1979

Fiscal Year 1979

	Natural cause	Homicide	Suicide	Disappearance	Slips and falls—ladders	Slips and falls—gangways	Slips and falls—on deck	Slips and falls—other	Falls from vessel—/to water	Falls into holds or tanks	Struck by objects; falling, dropped or moving	Exposure and asphyxiation	Struck against, crushed, bumped into objects	Operating machinery and tools	Burns (other than electrical) and scalds	Electrical shock and burns	Caught in lines, chains, or wire ropes	Pinching or crushing	Heavy weather	Overexertion, sprains, and strains	Cuts, lacerations, bruises, and punctures	Alterations and misconduct	Unknown or insufficient information	Total
Number of deaths	113	.....	7	9	6	1	1	14	119	19	31	18	3	1	.....	5	3	2	1	.....	.....	5	9	347
Number of uninspected vessels involved	33	.....	3	5	5	1	1	11	78	5	31	4	.....	1	.....	4	3	2	.....	.....	.....	3	1	181
Number of inspected vessels involved	80	.....	4	4	1	.....	.....	3	31	5	18	13	3	.....	.....	1	.....	.....	1	.....	.....	2	8	166
CAUSE OF DEATH																								
Intoxication	1	.....	.....	.....	2	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	5
Physical deficiency or handicap	110	.....	.....	.....	.....	.....	.....	.....	4	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	118
Unsafe movement or posture	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	3
Psychological—immaturity, insanity	.....	.....	7	1	.....	.....	1	.....	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	.....	23
Unsafe practice	.....	.....	.....	.....	1	.....	.....	2	4	2	3	1	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	1	15
Violation of law or regulation	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Human errors	.....	.....	.....	.....	3	.....	.....	7	41	4	13	5	1	1	.....	2	3	1	1	.....	.....	.....	.....	91
Decks slippery or cluttered	.....	.....	.....	.....	1	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Weather conditions	.....	.....	.....	.....	.....	.....	.....	.....	8	.....	2	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12
Poor maintenance or housekeeping	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Inadequate lighting	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Inadequate rails or guards	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Failure of equipment	.....	.....	.....	.....	.....	.....	.....	3	4	.....	10	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19
Inadequate supervision	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Inadequate life preservers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Inadequate tools or equipment	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Inadequate protective equipment	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Improper use of tools or equipment	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Miscellaneous causes	.....	.....	.....	8	.....	.....	.....	.....	37	2	3	7	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	7	65
TYPES OF VESSELS INVOLVED																								
Inspected vessels:																								
Passenger and ferry—large	6	.....	1	1	1	.....	.....	.....	.....	.....	.....	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12
Passenger and ferry—small	13	.....	2	1	.....	.....	.....	.....	4	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	26
Freight ships and barges	32	.....	1	.....	.....	.....	.....	.....	11	3	5	.....	1	.....	.....	.....	.....	.....	1	.....	.....	2	5	61
Tankships and barges	14	.....	.....	2	.....	.....	.....	1	7	1	1	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	30
Public	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Miscellaneous	13	.....	.....	.....	.....	.....	.....	2	10	1	4	3	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1	35
Uninspected vessels:																								
Fishing	13	.....	2	2	.....	.....	.....	.....	26	.....	3	2	.....	.....	.....	.....	2	.....	.....	.....	.....	1	.....	51
Tugs	13	.....	.....	2	.....	.....	1	1	19	.....	2	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	39
Foreign	0	.....	1	.....	5	1	.....	4	5	4	7	.....	.....	1	.....	1	.....	2	.....	.....	.....	2	.....	38
Miscellaneous	3	.....	.....	1	.....	.....	.....	6	28	1	9	2	.....	.....	.....	3	1	.....	.....	.....	.....	.....	1	53
TIME OF DAY																								
Daytime	75	.....	5	1	2	.....	.....	13	84	4	22	13	3	1	.....	4	1	2	1	.....	.....	2	3	236
Nighttime	29	.....	2	4	4	1	1	1	43	6	5	2	.....	.....	.....	1	2	.....	.....	.....	.....	3	4	106
Twilight	9	.....	.....	4	.....	.....	.....	.....	13	.....	4	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	33
PARTICULARS OF PERSON DECEASED																								
Papers of deceased:																								
License--Coast Guard	24	.....	.....	.....	1	.....	1	.....	7	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	2	.....	37
Document--Coast Guard	38	.....	1	4	.....	.....	.....	1	15	1	4	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	70
No license or document	47	.....	5	5	3	.....	.....	11	44	6	22	15	2	1	.....	4	3	.....	.....	.....	.....	1	3	211
Other--unknown- foreign	4	.....	1	.....	3	1	.....	2	4	2	5	1	.....	.....	.....	1	.....	2	.....	.....	.....	2	1	29
Status or capacity on vessel:																								
Passenger	31	.....	3	2	1	.....	.....	.....	7	.....	.....	7	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	43
Longshoreman--harbor worker	.....	.....	.....	.....	.....	.....	.....	.....	6	3	6	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	17
Crewmember	97	.....	4	7	5	1	1	4	93	5	18	3	2	.....	.....	4	3	2	1	.....	.....	5	5	250
Other	5	.....	.....	.....	.....	.....	.....	10	4	2	7	8	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	2	37
Activity engaged in:																								
Off duty	44	.....	2	1	1	1	.....	.....	13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2	65
Deck department duties	14	.....	.....	2	1	.....	.....	5	37	6	21	1	1	.....	.....	1	1	1	.....	.....	.....	2	2	95
Engine department duties	0	.....	.....	.....	.....	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	4	.....	.....	1	.....	.....	1	.....	10
Steward department duties	0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Handling cargo	1	.....	.....	.....	.....	.....	.....	.....	4	2	8	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
Fishing	7	.....	.....	.....	.....	.....	.....	.....	14	.....	1	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	16
Drills	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	24
Passenger	17	.....	3	2	1	.....	.....	.....	5	.....	.....	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Other and unknown	17	.....	2	4	3	.....	1	8	35	2	5	11	1	.....	.....	.....	.....	1	.....	.....	.....	1	1	32
Location:																						1	4	90
Great Lakes	0	.....	.....	.....	.....	.....	.....	.....	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9
Western Rivers	11	.....	2	.....	2	.....	.....	2	31	.....	4	2	1	.....	.....	1	.....	.....	.....	.....	.....	1	.....	58
Inland	62	.....	4	5	3	1	1	11	68	9	14	12	1	1	.....	3	3	1	.....	.....	.....	2	1	212
Oceans	18	.....	1	3	.....	.....	.....	.....	6	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	.....	.....	1	29
Foreign and other	18	.....	.....	1	.....	.....	.....	1	4	.....	2	2	.....	.....	.....	1	.....	1	.....	.....	.....	2	2	39

Deaths on Board Commercial Vessels Not Involving a Vessel Casualty -- Continued

October 1, 1978, to September 30, 1979
Fiscal Year 1979

	Natural cause	Homicide	Suicide	Disappearance	Slips and falls—ladders	Slips and falls—gangways	Slips and falls—on deck	Slips and falls—other	Falls from vessel—into water	Falls into holds or tanks	Struck by objects falling, dropped or moving	Exposure and asphyxiation	Struck against, crushed, bumped into objects	Operating machinery and tools	Burns (other than electrical) and scalds	Electrical shock and burns	Caught in lines, chains, or wire ropes	Pinching or crushing	Heavy weather	Overexertion, sprains, and strains	Cuts, lacerations, bruises, and punctures	Alterations and discomfort	Unknown or insufficient information	Total
PART OF BODY INVOLVED																								
Head	3	.....	1	.....	3	.....	1	7	9	5	11	.....	9	.....	.....	.....	.....	1	.....	.....	.....	3	1	60
Back	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1	.....	3
Chest	3	.....	.....	.....	1	.....	.....	.....	.....	.....	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	13
Extremities	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Illness	108	.....	.....	.....	.....	.....	.....	.....	2	.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	111
Drowning	.....	.....	6	7	2	1	.....	5	105	3	4	5	1	.....	.....	.....	2	.....	.....	.....	.....	.....	1	144
Unspecified and miscellaneous	1	.....	.....	2	.....	.....	.....	1	1	2	9	11	.....	.....	.....	4	1	1	.....	.....	.....	.....	3	36

Personnel Injuries on Board Commercial Vessels Not Involving a Vessel Casualty

October 1, 1978, to September 30, 1979
Fiscal Year 1979

	Natural cause	Homicide	Suicide	Disappearance	Slips and falls—ladders	Slips and falls—gangways	Slips and falls—on deck	Slips and falls—other	Falls from vessel—into water	Falls into holds or tanks	Struck by objects falling, dropped or moving	Exposure and asphyxiation	Struck against, crushed, bumped into objects	Operating machinery and tools	Burns (other than electrical) and scalds	Electrical shock and burns	Caught in lines, chains, or wire ropes	Pinching or crushing	Heavy weather	Overexertion, sprains, and strains	Cuts, lacerations, bruises, and punctures	Alterations and discomfort	Unknown or insufficient information	Total
Number of injuries	5	.....	.....	.....	111	17	251	130	16	5	386	4	114	50	43	6	60	47	3	305	64	47	48	1530
Number of uninspected vessels involved	1	.....	.....	.....	12	.....	15	14	12	1	45	.....	5	8	4	.....	27	6	.....	19	10	6	12	197
Number of inspected vessels involved	4	.....	.....	.....	99	17	236	122	4	4	341	4	109	42	39	6	33	41	3	186	54	41	36	1333
CAUSE OF INJURY																								
Intoxication	.....	.....	.....	.....	2	1	2	1	.....	.....	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1	1	.....	10
Physical deficiency or handicap	5	.....	.....	.....	1	.....	3	1	.....	.....	2	1	1	.....	.....	.....	.....	.....	.....	17	.....	.....	3	34
Unsafe movement or posture	.....	.....	.....	.....	12	.....	19	38	1	.....	11	.....	15	1	.....	1	4	4	.....	82	4	1	3	184
Psychological—immaturity, insanity	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	44	.....	46
Unsafe practice	.....	.....	.....	.....	21	.....	9	21	1	1	48	.....	9	6	11	.....	15	5	.....	13	5	.....	3	184
Violation of law or regulation	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Human errors	.....	.....	.....	.....	57	12	141	67	3	3	177	3	73	30	28	3	37	35	1	75	37	.....	16	903
Decks slippery or cluttered	.....	.....	.....	.....	8	3	57	1	.....	.....	3	.....	2	.....	.....	.....	.....	.....	.....	0	2	.....	.....	87
Weather conditions	.....	.....	.....	.....	5	.....	13	3	.....	.....	16	.....	12	1	.....	.....	2	1	2	0	4	.....	.....	65
Poor maintenance or housekeeping	.....	.....	.....	.....	1	.....	3	.....	.....	.....	6	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	10
Inadequate lighting	.....	.....	.....	.....	.....	.....	.....	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
Inadequate rails or guards	.....	.....	.....	.....	.....	.....	1	3	.....	.....	1	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
Failure of equipment	.....	.....	.....	.....	3	1	3	8	11	1	31	.....	3	.....	3	1	1	1	.....	1	2	.....	.....	64
Inadequate supervision	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	6
Inadequate life preservers	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Inadequate tools or equipment	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Inadequate protective equipment	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	.....	.....	2	1	.....	.....	.....	.....	.....	1	.....	.....	9
Improper use of tools or equipment	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
Miscellaneous causes	.....	.....	.....	.....	.....	.....	1	3	.....	.....	2	.....	.....	.....	2	1	.....	.....	.....	5	7	1	21	42

Personnel Injuries on Board Commercial Vessels Not Involving a Vessel Casualty -- Continued

October 1, 1979, to September 30, 1979
Fiscal Year 1979

	Natural cause	Homicide	Suicide	Disappearance	Slips and falls—ladders	Slips and falls—gangways	Slips and falls—on deck	Slips and falls—other	Falls from vessel—into water	Falls into holds or tanks	Struck by objects falling, dropped or moving	Exposure and asphyxiation	Struck against, crushed, bumped into objects	Operating machinery and tools	Burns (other than electrical) and scalds	Electrical shock and burns	Caught in lines, chains, or wire ropes	Pinching or crushing	Heavy weather	Overexertion, sprains, and strains	Cuts, lacerations, bruises, and punctures	Alterations and misconduct	Unknown or insufficient information	Total
TYPES OF VESSELS INVOLVED																								
Inspected vessels:																								
Passenger and ferry—large	1	.....	.....	.....	1	.....	9	4	.....	.....	4	1	.....	.....	.....	.....	1	.....	.....	5	.....	.....	.....	26
Passenger and ferry—small	1	.....	.....	.....	3	.....	6	2	.....	.....	3	.....	.....	.....	.....	.....	2	.....	1	1	.....	.....	.....	19
Freight ships and barges	2	.....	.....	.....	74	13	167	92	3	2	183	1	71	29	16	1	19	29	2	145	41	32	24	963
Tankships and barges	.....	.....	.....	.....	11	2	46	19	.....	1	22	.....	6	7	10	3	6	7	.....	27	6	7	9	212
Public	.....	.....	.....	.....	7	2	3	1	.....	1	2	.....	5	3	1	.....	.....	2	.....	4	3	2	.....	41
Miscellaneous	.....	.....	.....	.....	3	.....	10	4	1	.....	30	2	6	3	1	2	5	3	.....	4	4	.....	1	78
Uninspected vessels:																								
Fishing	1	.....	.....	.....	3	.....	5	5	.....	.....	19	.....	3	3	1	.....	19	4	.....	2	2	1	4	75
Tugs	.....	.....	.....	.....	5	.....	6	5	1	.....	20	.....	1	1	1	.....	8	2	.....	13	4	4	4	73
Foreign	.....	.....	.....	.....	.....	.....	1	2	.....	.....	2	.....	.....	1	2	.....	.....	.....	.....	1	.....	1	2	13
Miscellaneous	.....	.....	.....	.....	4	.....	3	2	11	1	4	.....	1	3	.....	.....	2	.....	.....	3	1	.....	2	37
TIME OF DAY																								
Daytime	3	.....	.....	.....	71	6	165	94	12	3	215	3	82	40	31	4	41	36	2	152	40	23	30	1053
Nighttime	1	.....	.....	.....	34	10	67	35	3	1	69	1	34	9	8	2	16	9	1	39	10	22	4	360
Twilight	1	.....	.....	.....	6	1	19	7	1	1	22	.....	9	2	4	.....	3	2	.....	34	6	3	12	123
PARTICULARS OF PERSON INJURED																								
Papers of person injured:																								
License--Coast Guard	1	.....	.....	.....	17	1	25	19	1	1	47	1	13	11	10	3	5	3	1	30	9	6	7	216
Document--Coast Guard	2	.....	.....	.....	81	18	200	99	3	3	301	.....	93	29	20	3	28	37	1	100	45	38	29	1097
No license or document	2	.....	.....	.....	13	.....	35	16	12	1	38	3	8	9	6	2	27	7	1	14	10	3	8	223
Other--unknown--foreign	.....	.....	.....	.....	.....	.....	1	2	.....	.....	2	.....	.....	1	1	.....	.....	.....	.....	1	.....	.....	2	10
Status or capacity on vessel:																								
Passenger	1	.....	.....	.....	6	.....	8	4	.....	.....	2	1	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	24
Longshoreman--harbor worker	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crewmember	4	.....	.....	.....	103	17	238	129	6	5	298	1	110	45	40	6	58	44	3	201	62	47	1	1
Other	.....	.....	.....	.....	2	.....	5	3	10	.....	18	2	3	5	3	.....	2	3	.....	4	2	.....	1	1450
Activity engaged in:																								61
Off duty	1	.....	.....	.....	14	15	22	17	.....	1	5	.....	11	.....	1	.....	2	4	.....	15	3	18	.....	129
Deck department duties	.....	.....	.....	.....	40	2	113	70	4	3	168	.....	61	16	6	.....	40	13	1	98	27	5	15	702
Engine department duties	2	.....	.....	.....	35	.....	38	38	.....	1	61	.....	35	28	28	3	1	9	1	57	14	2	6	337
Steward department duties	.....	.....	.....	.....	9	.....	41	18	.....	.....	17	.....	7	.....	3	3	.....	11	.....	24	8	10	9	151
Handling cargo	.....	.....	.....	.....	1	.....	3	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	8
Fishing	1	.....	.....	.....	.....	.....	8	1	.....	.....	12	.....	.....	1	.....	1	16	2	.....	1	2	.....	.....	45
Drills	.....	.....	.....	.....	.....	.....	3	.....	11	.....	5	.....	4	1	.....	.....	.....	.....	.....	3	1	.....	.....	28
Passenger	1	.....	.....	.....	6	.....	6	4	.....	.....	2	.....	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	31
Other and unknown	.....	.....	.....	.....	6	.....	17	8	1	.....	14	4	5	4	5	.....	1	8	.....	8	9	12	13	115
Location:																								
Great Lakes	.....	.....	.....	.....	7	.....	8	7	.....	.....	15	.....	3	3	2	.....	1	1	.....	12	4	.....	.....	63
Western Rivers	.....	.....	.....	.....	3	.....	6	3	2	1	9	.....	2	1	2	.....	3	1	.....	6	.....	3	.....	42
Inland	2	.....	.....	.....	35	6	71	36	2	2	106	3	26	18	19	3	35	16	3	43	12	14	22	473
Oceans	1	.....	.....	.....	24	.....	31	31	.....	1	73	1	34	8	11	3	9	13	1	46	18	7	7	367
Foreign and other	2	.....	.....	.....	43	11	95	39	12	1	108	.....	49	20	9	1	12	16	.....	96	30	23	17	591
PART OF BODY INVOLVED																								
Head	.....	.....	.....	.....	21	5	48	30	.....	.....	79	.....	19	2	10	1	1	2	1	17	4	30	5	283
Back	.....	.....	.....	.....	27	1	43	13	10	2	10	1	18	1	.....	.....	.....	.....	1	88	1	.....	2	289
Chest	.....	.....	.....	.....	12	2	31	22	4	1	17	.....	19	3	5	.....	2	2	1	24	3	4	4	156
Extremities	.....	.....	.....	.....	47	11	125	74	2	2	192	2	63	44	30	2	56	42	.....	74	55	12	20	843
Illness	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	2	8
Drowning	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Unspecified and miscellaneous	.....	.....	.....	.....	4	.....	4	7	.....	.....	8	1	3	.....	6	3	1	1	.....	1	1	1	13	54

Marine Safety Council Membership

As our readers may have noticed from the masthead, the Marine Safety Council has undergone some changes in the past year. Rear Admiral Richard A. Baumann joined the Council in May 1980, when he was appointed Chief of the newly established Office of Navigation. In July 1980 the Office of Boating Safety was merged with the Office of Public and International Affairs to become the Office of Boating, Public, and Consumer Affairs; Rear Admiral H. W. Parker was appointed as the Chief of the newly consolidated office and assumed a seat on the Council. The Council continues to be chaired by Rear Admiral Clifford F. DeWolf, a profile of whom follows:

Rear Admiral DeWolf took charge of the Coast Guard Chief Counsel's Office in September of 1978.

He began his career in the U.S. Coast Guard in 1950 as an ensign aboard the CGC BIBB and advanced through various capacities to Operations Officer/ Navigator. Entering the Coast Guard Academy as a Cadet in July 1946, he graduated with a degree in General Engineering in 1950. He was subsequently assigned as Commanding Officer of an 83-foot patrol boat in Alaska. This led to his assignment as part of the original 95-footer precommissioning detail in Curtis Bay, Maryland. Following that tour of duty, he returned to Alaska as Commanding Officer of the CAPE CORAL, one of the first twelve 95-foot patrol boats. After being selected for legal training in 1955, he attended Georgetown University Law Center in Washington, DC. He received his Juris Doctor Degree from that institution in 1957 and was admitted to the bar. After a short postgraduate indoctrination tour in the Legal Division at U.S. Coast Guard Headquarters, he was assigned as Commanding Officer of the CGC LEGARE, a ship engaged in search and rescue out of New Bedford, Massachusetts. He next served a tour at the Coast Guard Academy as an instructor in law, seamanship, and other professional studies.

In 1963 Rear Admiral DeWolf was assigned as Staff Legal Officer in the 17th Coast Guard District at Juneau, Alaska. From there he was assigned to the CGC CHAUTAUQUA, first as Executive Officer and then as Commanding Officer on ocean station patrol between Hawaii and Japan. From 1967 to 1972 he served as the Coast Guard's principal legislative counsel during the development and drafting of the Federal Boat Safety Act, the Ports and Waterways Act, and other legislation important to the Coast Guard.

In the absence of a Coast Guard Judge Advocate General Corps, Rear Admiral DeWolf served collaterally throughout his career as counsel and Law Officer in Coast Guard courts-martial and related activities. He also served collaterally as a judge for the appellate review of courts-martial on the Coast Guard Court of Review. In 1972 he was assigned as one of two full-time Coast Guard military trial judges for the trial of general and special courts-martial. This was followed by a tour as Staff Legal Officer of the 12th Coast Guard District in San Francisco. He was advanced to Chief, Operations Division, in that District in July 1975. Rear Admiral DeWolf, as a Captain, served as Chief of Staff in the Eighth Coast Guard District from September 1976 until his promotion to the rank of Rear Admiral in June 1978. From that time until his assignment as Chief Counsel he served as Commander, Eighth Coast Guard District.

Rear Admiral DeWolf's awards include the Meritorious Service Medal, the Coast Guard Commendation Medal, the National Service Defense Medal, and the WWII Victory Medal.

Rear Admiral DeWolf was born on May 8, 1928, in New Haven, Connecticut. He is married to the former Marcia B. Staub of Waterford, Connecticut. They have five children: Keith, Janice, Christine, Kent, and Mark. ⚓

Navigation and Vessel Inspection Circulars

The effective Navigation and Vessel Inspection Circulars listed below can be obtained individually or by subscription, free of charge, by writing to Commandant (G-MP-4/14), U.S. Coast Guard Headquarters, Washington, DC 20593, or calling (202) 426-2163.

7-56	Manned LSTs; Structural Reinforcement and Drydocking; Hull Inspection Requirements
10-60	Placards, Forms, and Instructions Required to be Posted Aboard Vessels; Alternate Materials and Methods
12-61	Inspection Procedures for Approved Inflatable Life Rafts Held in Storage
2-62	Watertight Bulkheads in All Inspected Vessels—Maintenance of Watertight Integrity
4-62	Renewal of Deck Officers' Licenses--Great Lakes
5-62	Renewal of Deck Officers' Licenses--Western Rivers
9-62	Liquefied Compressed Gas Cargo Hose
1-63	Notes on Inspection and Repair of Wooden Hulls
2-63	Guide for Inspection and Repair of Lifesaving Equipment
11-63	LSTs as Unmanned Barges; Structural Reinforcement and Drydocking; Hull Inspection Requirements
5-64 CH-1,2	Renewal of Ocean Operators' and Operators' Licenses
7-64	Renewal of Operators' Licenses—Great Lakes
8-64	Renewal of Operators' Licenses—Western Rivers
8-64A	Renewal of Operators' Licenses—Western Rivers
1-65	24.0' x 8.0' x 3.58' Steel Lifeboats with Removable Interiors, Oar-propelled (App. No. 160.035/398/0), Hand-propelled (App. No. 160.035/411/0), and Motor-propelled (App. No. 160.035/412/0), manufactured by Welin Davit & Boat, Perth Amboy, New Jersey, Replacement of Short Breast Plates
7-65 CH-1	Renewal of Deck Officers' Licenses
10-65	Stability Determination in Capsizing Cases Involving Uninspected Vessels
12-65	Alteration or Modification of Existing Cargo or Tank Vessels; Associated Safety Improvements
1-66	Requirements for Hull Structural Steel—Structural Continuity
3-66	Dual Tonnages; Application of
1-67	Stability Test--Preparations and Procedures
3-67	Alteration of Ship's Structure Which May Affect the Adequacy of Installed Safety Devices
4-67	Application of Incombustible Insulation Requirements and Identification of Approved Materials
8-67	Fixed Mud Ballast; Procedures and Standards for its Use
3-68	Tensile Fasteners
4-68	Protective Equipment Required for Firemen's Outfits
7-68	Notes on Inspection and Repair of Steel Hulls
8-68	Classification of Vessels as Self-propelled
1-69	Automated Main and Auxiliary Machinery
2-69	Submission of Reports for the Shipment and Discharge of Seamen Not Shipped or Discharged Before a Shipping Commissioner; Information Concerning
3-69	Z Nomograph Method of Calculating Available GM
4-69	Inclusion of Social Security Numbers on Certificates of Discharge and Discharges for Masters
5-69	Carriage of Flammable and Combustible Liquids in Portable Tanks
7-69 CH-1,2,3	Hydraulic Releases with Primary Lifesaving Equipment and Alternate Float-Free Arrangements
8-69	Impulse-Projected Rocket Type Line-Throwing Appliances
11-69	Statement of Claims for Specially Exempted Water-ballast Spaces in Tonnage Calculations
12-69	Special Examination in Lieu of Drydocking for Large Mobile Drilling Units
2-70	Acceptance of Pressure Vessels Used as Decompression Chambers or for Other Purposes Related to Diving
4-70	Powder Loads for Lyle Type Line Throwing Guns

6-70	Fixed Fire Extinguishing Systems for Use in Galley Ventilating Equipment
7-70	Marine Type Portable Fire Extinguishers
1-71	Repair of Boiler Safety Valves
2-71	Pipe Stress Analysis Calculations; Procedure for Submission of
4-71	Valves Employing Resilient Material
5-71	Index to 46 CFR Part 151 (Certain Bulk Dangerous Cargoes on Unmanned Tank Barges), Subchapter O
6-71	Monitoring Carbon Monoxide (CO) in Ship's Cargo Spaces
2-72	Coast Guard Approval of Hull Structural Plans
3-72	Portable Radio Apparatus, Training in Use of
4-72	Definition of Paraffinic Hydrocarbon Commodities
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4-79	Recommended Procedures for Using Smith & Wesson International Line Throwing Appliances
5-79	Inerting and Tank Cleaning Procedures for Alkylene Oxide Containment Systems
6-79	Coast Guard Review of Merchant Vessel Plans and Specifications
7-79	1969 Amendments to the International Convention for the Prevention of Pollution of the Sea by Oil 1954; Operational Compliance with
8-79	Shipment and Discharge of Seamen
1-80	Inspection of Viking On-load Release Gear on Watercraft America Lifeboats
2-80	Poured Metal Socket Connections for Lifeboat Falls
3-80	Acceptance of Gel Coats and Composite Laminate Coatings Which Meet 46 CFR 177.10-5(a-1)
4-80	Installation of Retroreflective Material and PFD Lights on Lifesaving Equipment
5-80	Recommended Procedures for Control of Asbestos Hazard on Board Merchant Vessels, OCS Facilities and Deepwater Ports
6-80	Guide to Structural Fire Protection Aboard Merchant Vessels
7-80	Use of Fire Detection Systems Which Are Not Approved under 46 CFR 161.002
8-80	Fire Hazard of Polyurethane and Other Organic Foams
9-80	Servicing Requirements of Inflatable Liferafts
10-80 CH-1	Temporary Licenses and Certificates of Service for the Crews of Offshore Supply Vessels under P.L. 96-378
11-80	Structural Plan Review Guidelines for Aluminum Small Passenger Vessels
12-80	National Fire Protection Association (NFPA) Standard No. 306, "Control of Gas Hazards on Vessels 1980"
13-80	Breathing Apparatus for Tank Vessels

Chlorine: Cl_2

Physical Properties	
boiling point:	-34.05°C (-29.3°F)
freezing point:	-101.00°C (-149.8°F)
vapor pressure at 46°C (115°F):	12.2 atm (180 psia)
Threshold Limit Values	
time weighted average:	1 ppm (0.0001%)
short term exposure limit:	3 ppm (0.0003%)
Densities	
liquid density:	1.56 (water = 1.0) at -35°C
vapor density:	2.49 (air = 1.0) at 0°C
Identities	
U.N. Number	1017
CHRIS Code	CLX

Chlorine is a heavy, noncombustible gas with a pungent, irritating odor. Although chlorine does not burn, it can increase the severity of a fire because of its highly reactive nature. The gas is greenish-yellow, while liquefied chlorine is clear and amber-colored. As might be expected from the fact that it was used as a poison gas in World War I, chlorine is extremely toxic. It is liquefied for shipping and large-volume storage, since liquefied chlorine will fit into only 0.2 percent of the space occupied by the gas (the quantity of chlorine that can be carried as a liquid in one barge would require 456.8 barges if it were carried as a gas). By the same token, however, one volume of liquid expands to 456.8 volumes at 0°C and 1 atm, which means that a ruptured tank can give rise to a large vapor cloud. The chlorine vapor is dangerous; breathing a concentration of only 1000 ppm (0.10%) will result in death in minutes, and breathing a concentration of 40 to 60 ppm (0.004 to 0.006%) for 30 to 60 minutes can cause permanent lung damage. As shown above, the Workplace Time Weighted Average is a mere 1 ppm (0.0001%)--in other words, employees working a normal 8-hour day, 40-hour week may be repeatedly exposed to a concentration of only 1 ppm before suffering adverse effects. The Short Term Exposure Limit, the maximum concentration a worker may be exposed to for 15 minutes or less without suffering irritation, irreversible tissue change, or impairment of judgment (provided such exposure occurs no more than 4 times a day, the periods of exposure are spaced at least 1 hour apart, and the Time Weighted Average is not exceeded), is 3 ppm (0.0003%). Since the least detectable odor is 3.5 ppm (0.00035%), immediate action should be taken if an employee smells chlorine. Since chlorine is heavier than air, it is slow to disperse and tends to accumulate in low places. When contaminated with water, it will form an acid which can corrode almost all container metals. This means that if there is a leak in a tank, the hole tends to enlarge.

Chlorine was produced by alchemists as early as the thirteenth century, but the first real study of the substance did not take place until 1774. Chlorine was first used to make bleach in 1779. Today it is used to make chlorinated cleaning solvents (carbon tetrachloride, trichloroethylene), plastics (vinyl chloride, neoprene), and acids (hydrochloric, chloroacetic). One of its few direct uses is in water purification.

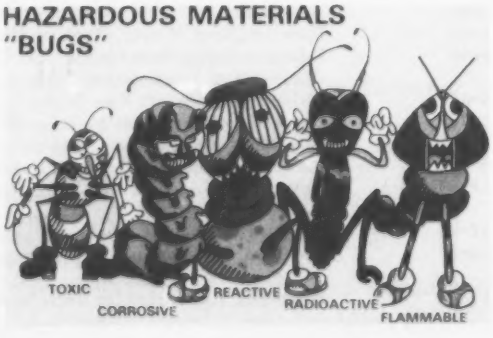
Chlorine is an important commodity: in terms of volume produced, it ranked eighth among chemicals in 1979. Chlorine is usually produced by electrolyzing sodium chloride (table salt) and potassium chloride. Caustic soda and caustic potash are by-products. The electrolysis units work somewhat like primary batteries running backwards, with electricty used as the "fuel."

Chlorine is regulated by the U.S. Coast Guard (which has designated it as a Cargo of Particular Hazard), by the U.S. Department of Transportation (which classifies it as a nonflammable gas), by the U.S. Environmental Protection Agency (which assigns it to pollution category A), and by the Intergovernmental Maritime Consultative Organization (which considers it a liquefied gas). Because of chlorine's high toxicity, the Coast Guard allows it to be transported only on unmanned barges carrying no more than 1200 tons; individual tanks aboard each barge may hold no more than 300 tons.

The Coast Guard has studied liquefied chlorine spills on water and is now participating in international studies of heavier-than-air vapor dispersion, which would be applicable to chlorine. Nontoxic gases will be used in place of chlorine, however.

Those desiring more information on chlorine might wish to contact the Chlorine Institute, Inc., 342 Madison Ave, New York, NY 10173, Tel. : (212) 682-4324. The Institute is a nonprofit organization concerned with safety in the manufacture, transportation, distribution, and use of chlorine. ↕

ALAN L. SCHNEIDER, Sc.D., and CURTIS PAYNE, B.A.
Hazard Evaluation Branch
Cargo and Hazardous Materials Division



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Nautical Queries

The following items are examples of questions included in the Third Mate through Master examinations and the Third Assistant Engineer through Chief Engineer examinations.

DECK

(1) The primary wind belt which has the greatest effect on the set, drift, and depth of the equatorial currents is the

A. doldrums.
B. horse latitudes.
C. trade winds.
D. prevailing westerlies.

REFERENCE: Bowditch, Duttons

(2) "Priming" of the tides occurs

A. at times of new and full moon.
B. when the earth, moon, and sun are lying approximately on the same line.
C. when the moon is between first quarter and full and between third quarter and new.
D. when the moon is between new and first quarter and between full and third quarter.

REFERENCE: Bowditch

(3) Charted depth is the

A. vertical distance from the tidal datum to the ocean bottom plus the height of the tide.
B. vertical distance from the tidal datum to the ocean bottom.
C. average height of water over a specified period of time.
D. average height of all low waters at a place.

REFERENCE: Bowditch

(4) Which is true concerning the speed of fronts?

A. Cold fronts move faster than warm fronts.
B. Cold fronts move more slowly than warm fronts.
C. Cold fronts and warm fronts move with equal speed.
D. Cold fronts move more slowly at the northern end, thus allowing the warm front to overtake the northern section.

REFERENCE: Meteorology

(5) Set of current is

A. its velocity in knots.
B. direction from which it flows.
C. estimated current.
D. direction toward which it flows.

REFERENCE: Duttons

ENGINEER

(1) Which statement about copper wire sized by AWG numbers is correct?

A. Number 12 AWG wire has a higher current rating than 10 AWG wire.
B. Number 10 AWG wire has a higher dielectric strength than 12 AWG wire.
C. Number 12 AWG wire is larger than number 10 AWG wire.
D. Number 12 AWG wire at 25°C has more resistance per 1000 feet than 10 AWG wire at 25°C.

REFERENCE: Hubert

(2) "Thin-tipping" in modern reaction turbines is a procedure designed to

A. allow for axial expansion.
B. allow for measurement of radial misalignment.
C. reduce tip leakage.
D. prevent casing damage.

REFERENCE: Naval Turbines

(3) Axial thrust in a single-flow multistage impulse turbine is minimal because

I. there is no pressure drop across the moving blades.
II. a dummy piston and cylinder are used at the turbine inlet end.

A. I only
B. II only
C. Both I and II
D. Neither I nor II

REFERENCE: Principles of Naval Engineering

(4) In a compression refrigeration cycle, the refrigerant temperature decreases the most in the

A. evaporator.
B. condenser.
C. compressor.
D. expansion valve.

REFERENCE: Althouse

(5) The direction of a hydraulic cargo winch is reversed by reversing the hydraulic pump

I. shaft rotation.
II. tilting box angle.

A. I only
B. II only
C. Either I or II
D. Neither I nor II

REFERENCE: Harrington

ANSWERS

Engineer
1.D; 2.C; 3.A; 4.D; 5.B

Deck
1.C; 2.D; 3.B; 4.A; 5.D

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications may be obtained from the nearest marine safety office, marine inspection office or by writing: **Commandant (G-CMA/TP26), U.S. Coast Guard, Washington, DC 20593.** Certain publications listed below are reprints of various sections of the Code of Federal Regulations. Because changes to the rules and regulations are made from time to time, these publications can be kept current between revisions only by referring to the Federal Register. (Official changes to all Coast Guard-authored federal regulations are published as final rules in the Federal Register on Mondays or Thursdays.) Following the title of each publication in the table below are the dates of the most recent editions and changes, if any.

The Federal Register may be obtained by subscription ($75 per year) or by individual copy ($1 each) from SupDocs, U.S. Government Printing Office, Washington, DC 20402.

	CG No.	TITLE OF PUBLICATION
		NOTE: This is a newly revised list; please check carefully for changes.
1	CG-101-1	Specimen Examinations for Merchant Marine Deck Officers (2nd and 3rd Mate) (4-1-77).
1	CG-101-2	Specimen Examinations for Merchant Marine Deck Officers (Master and Chief Mate) (7-1-78).
	CG-108	Rules and Regulations for Military Explosives and Hazardous Munitions (4-1-72). FR 7-21-72, 12-1-72, 6-18-75, 9-26-77, 5-12-80.
	CG-115	Marine Engineering Regulations (8-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78, 3-12-79, 5-3-79, 2-19-80, 4-21-80, 9-29-80.
1	CG-123	Rules and Regulations for Tank Vessels (8-1-77). Ch-1, 4-78. FR 1-3-77, 8-18-77, 9-12-77, 9-26-77, 9-29-77, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79, 11-19-79, 12-27-79, 1-31-80, 3-3-80, 4-3-80, 4-7-80, 4-10-80, 4-14-80, 5-5-80, 5-30-80, 8-7-80, 9-29-80, 11-24-80.
	CG-169	Navigation Rules - International - Inland (5-1-77). FR 7-11-77, 7-14-77, 9-26-77, 10-12-77, 11-3-77, 12-6-77, 12-15-77, 3-16-78.
	CG-169-1	Colregs Demarcation Lines (7-15-77).
1	CG-172	Rules of the Road - Great Lakes (7-1-72). FR 10-6-72, 11-4-72, 1-16-73, 1-29-73, 5-8-73, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 1-13-77, 11-3-77, 12-6-77.
1	CG-174	Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products (9-1-76).
1,2	CG-175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3-1-73).
1,2,4	CG-176	Load Line Regulations (2-1-71). FR 10-1-71, 5-10-73, 7-10-74, 10-14-75, 12-8-75, 1-8-76, 7-24-78, 8-28-80.
6	CG-177	Yacht Admeasurement and Documentation (9-72).
1	CG-182-1	Specimen Examinations for Merchant Marine Engineers License (2nd and 3rd Assistant) (4-75).
	CG-182-2	Specimen Examinations for Merchant Marine Engineer Licenses; First Assistant Engineer, Steam and Motor, any Horsepower (4-76).
	CG-182-3	Specimen Examinations for Merchant Marine Engineer Licenses; Chief Engineer Steam and Motor, any Horsepower (4-76).
1	CG-184	Rules of the Road--Western Rivers (8-1-72). FR 9-12-72, 12-28-72, 3-8-74, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 3-1-76, 6-10-76, 7-11-77, 12-6-77, 12-15-77.
1	OLD CG-190, Equipment Lists (8-1-79), now M16714.3.	
1	CG-191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (11-1-76). FR 3-3-77, 5-16-77, 8-8-77, 4-9-79, 12-6-79, 10-20-80.
	CG-227	Laws Governing Marine Inspection (7-1-75).
	CG-242	International Conventions & Conferences on Marine Safety (6-51).
1,2,5	CG-257	Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-77). Ch-1, 3-17-78. FR 1-31-77, 9-26-77, 9-29-77, 12-19-77, 10-10-78, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79, 4-10-80, 5-5-80, 9-29-80, 10-20-80, 11-24-80.
	CG-258	Rules and Regulations for Uninspected Vessels (4-77). FR 9-26-77, 9-29-77, 6-14-79, 7-2-79, 12-17-79, 2-4-80, 2-19-80, 11-24-80.
1	CG-259	Electrical Engineering Regulations (7-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78.
	CG-268	Rules and Regulations for Manning of Vessels (7-1-77). FR 11-19-79, 10-20-80.
1	CG-293	Miscellaneous Electrical Equipment List (6-73).
	CG-323	Rules and Regulations for Small Passenger Vessels (7-1-77). Ch-1 3-17-78. FR 9-26-77, 10-25-77, 12-15-77, 7-17-78, 3-12-79, 6-1[illegible]-79, 7-2-79, 12-13-79, 2-19-80, 3-3-80, 9-29-80, 10-20-80, 11-24-80.
	CG-329	Fire Fighting Manual for Tank Vessels (1-1-74).
3	CG-388	Chemical Data Guide for Bulk Shipment by Water (1976).
1	CG-403	Great Lakes Pilotage Regulations (7-76).
	CG-439	Bridge to Bridge Radiotelephone Communications (12-1-72). FR 12-28-72, 3-8-74, 5-5-75, 7-11-77.
1	CG-467	Specimen Examinations for Uninspected Towing Vessel Operators (10-1-74).
	CG-474	When You Enter That Cargo Tank (3-76).
1	OLD CG-478, Liquefied Natural Gas and Liquefied Petroleum Gas, Views and Practices, Policy and Safety (3-80), now M16616.4.	
1	CG-480	Oil Pollution Control for Tankermen (6-75).
1	CG-482	Benzene Safe Handling Practices (12-76).
	CG-486	Shippers Guide to Hazardous Materials Regulations (Water Mode) (8-77).
	CG-491	Safety for Small Passenger Vessels (8-77).
	OLD CG-497, Rules and Regulations for Recreational Boating (12-78), now M 16752.2 (12-78) FR 7-19-79.	
3	CG-515	Rules and Regulations for Foreign Vessels Operating in the Navigable Waters of the U.S. (12-1-77). Ch-1 5-7-80. FR 4-10-80, 4-14-80, 5-5-80, 5-8-80, 5-19-80, 5-22-80, 6-26-80, 6-30-80, 7-17-80, 7-21-80, 8-7-80, 8-11-80, 8-14-80, 8-18-80, 8-28-80, 9-29-80, 10-16-80, 10-20-80, 10-23-80, 10-30-80, 11-24-80.
1	CG-526	Utilizing the Packaged Hazardous Materials Regulations, 49 CFR (5-78).
	Safety of Life at Sea: Convention, with Regulations, London, June 17, 1960.	
	Specifications for Merchant Vessel Equipment (Subparts of Chapter Q, 46 CFR, parts 160 to 164. 4-10-80, 5-5-80, 7-3-80, 9-29-80, 11-10-80.	

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1 Temporarily out of stock
2 Under revision
3 Available only through Superintendent of Documents (SupDocs)
4 Text can be found in Title 46 of the Code of Federal Regulations, Parts 41-69
5 Text can be found in Title 46 of the Code of Federal Regulations, Parts 90-109.
6 Cancelled

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